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OCTOBER 29, 1936

THE IRON AGE

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ALLOY STEEL DIVISION, MASSILLON, OHIO

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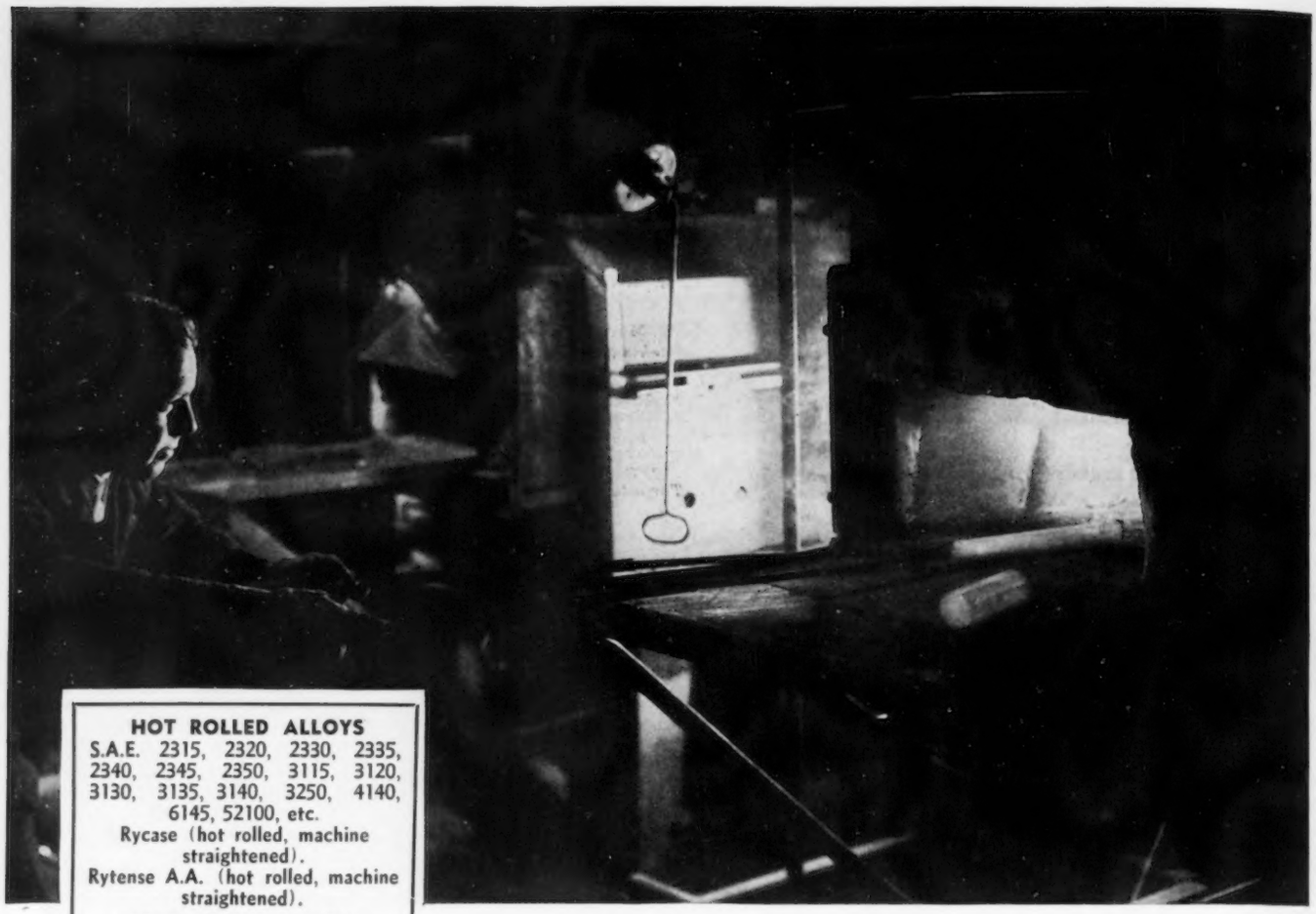

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OCTOBER 29, 1936

ESTABLISHED 1855 Vol. 138, No. 18

A Good "Belly Laugh" Is a Tonic

THIS is the Metal Congress report number of The Iron Age. As is customary, it appears just after the annual meeting and exhibition of a number of related technical societies, including the American Society for Metals, the American Institute of Mining and Metallurgical Engineers, the American Welding Society and the iron and steel and machinery divisions of the American Society of Mechanical Engineers.

A great many people from the metal-working industry convened at these assemblies to learn, through eye and ear, of the progress that has been made in these fundamental branches of American industry.

Many, indeed most of those who attended, marveled at the strides that have been taken by our engineers, our scientists and research workers in improving quality and in producing new and valuable products and methods for the advancement of American standards of working and of living.

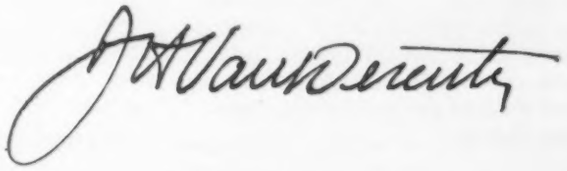
How many of them gave thought to why and and how these advancements and improvements have been brought about?

How many of them will have the imagination necessary to picture the patient toiling of thousands of research men in hundreds of plants and laboratories scattered all over America that was the necessary forerunner to these concrete results.

These men have performed their marvelous work, not under the centralized dictation of a regimented industrial economy but under the fruitful impetus of original ideas and initiative, in the good old American way.

Ponder for a moment on these methods and results as contrasted with what might be expected under the procedure recommended to America by chief brain truster Rexford G. Tugwell. You may remember his classical reference to the automotive industry and its development under private initiative and individual ideas and inspirations. In the future, he predicted, assuming a planned economy, such improvements will not "happen" in that manner, for instead of being the fruit of individual efforts they will be brought about through discussions in Washington.

Ask yourself how much progress that you observed at Cleveland would have been brought about through "discussions at Washington." The answer may induce a wholesome and tonicking belly laugh at the naivety of Rexie and his brain trust playmates who are so busily prescribing the administration's remedies for our economic ills.



REVIEW of the METALS CONGRESS

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Eighteenth Metal Congress Most Successful in History—A.S.M., A.I.M.E., A.S.M.E. and A.W.S. Make Citations, Elect Officers and Award Medals.

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WITH an unusually large attendance, more extensive discussion of technical subjects and an exhibit that surpassed all former displays of methods, material and equipment, and an unusual amount of interest shown in the technical papers and exhibition, the eighteenth annual National Metal Congress and National Metal Exposition held in Cleveland Oct. 19 to 24 was generally declared to be the most successful that has ever taken place.

The exhibition was held at the Lakeside Exposition Hall adjoining the Cleveland Public Auditorium, registration being carried on in the latter building in which many of the technical sessions were held. Other technical meetings took place in the Statler and Cleveland Hotels.

Participating in the Congress were the American Society for Metals, Institute of Metals and Iron and Steel Divisions of the American Institute of Mining & Metallurgical Engineers and American Society of Mechanical Engineers.

The technical papers read and discussed numbered around 120, a large increase over the number presented at any previous meetings. All the technical sessions were well attended. Although there is usually a small attendance at the first technical session of the American Society for Metals there were over 500 present at the opening session of this Society Monday. One day five sessions of this Society were being held simultaneously.

The total registration during the week was over 20,000. The exhibits were 212 in number and occupied 165,000 sq. ft. of floor space. That they were more interesting and arranged in a more attractive manner than exhibits at previous shows seemed to be the consensus of opinion. Wide aisles and colorful decorations in the exhibit hall added to the attractiveness of the displays. Departing from previous custom the exhibit was a "closed shop" until the last day, being limited to persons directly interested in the display. During the closing day the doors were open to men employed in Cleveland and vicinity.

The annual meeting of the American Society for Metals held at the Statler Hotel Wednesday morning was attended by approximately 500 members. Robert S. Archer, pres-

ident of the society and chief metallurgist of the Republic Steel Corp., Chicago district, presided.

The Society has a membership of 7691, as of Oct. 1, a gain of 811 during the year. This was brought out in the annual report of W. H. Eisenman, secretary. Mr. Archer announced that no award of the Henry Marion Howe Memorial Medal for the best paper published in the Society's Transactions during the past year would be made during this year's convention. Awards in the future will be made a year after the judging period closes to allow a longer period of time for consideration of papers.

Announcement was made that the Albert Sauveur Achievement Award, established two years ago to recognize outstanding contributions to metallurgical knowledge, was to go to W. R. Chapin, director of research, E. C. Atkins & Co., Indianapolis. This award was made to Mr. Chapin in recognition of work he performed several years ago in connection with the quenching of steel.

The bell and gavel which are annually awarded to a chapter in recognition of its growth and activity during the year were given to the Peoria, Illinois, chapter. This chapter, organized in November, 1934, with 89 members, has increased its membership to 243. Honors were extended to secretaries of ten chapters who have held office for ten or more years. These men and their lengths of service are: Alex Caswell, Northwest, 16 years; T. N. Holden, New York, 15 years; H. L. Walker, Pittsburgh, 13 years; C. G. Peterson, Rhode Island, 11 years; Howard E. Handy, Boston, 10 years and I. C. Matthews, Rochester, 10 years.

The officers nominated last spring were formally elected.

The Edward DeMille Campbell Memorial lecture was presented at the close of the annual meeting of the American Society for Metals by J. P. Gill, Vanadium-Alloys Steel Co., Latrobe, Pa. The speaker discussed the carbide segregate and grain size of high speed steel to explain some puzzling phenomena of its behavior. He dealt with only one composition of high speed alloy, a steel containing 0.70 per cent carbon, 18 per cent tungsten, 4 per cent chromium, 1 per cent vanadium and about 0.25 per cent of manganese and 0.30 per cent of silicon.

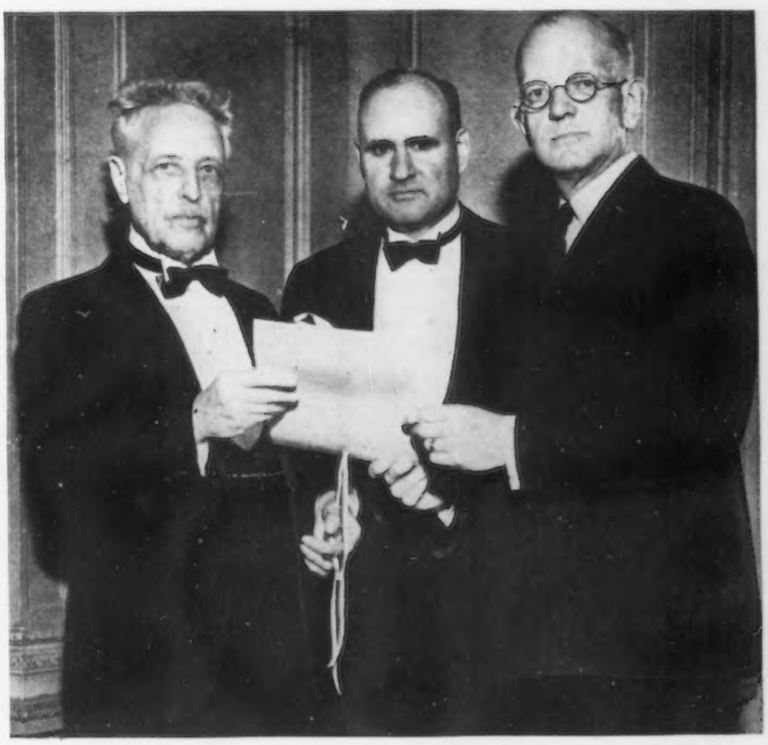
An educational course of five lectures on the physical testing of metals and interpretational test results was given by Harry D. Churchill, Associate Professor of Mechanics, Case School of Applied Science. A three-lecture evening course on X-ray analysis was presented by Dr. Kent R. Van Horn, research metallurgist of the Aluminum Co. of America, as one of the educational features of the Congress.

There were over 800 guests at the banquet of the American Society for Metals held at the Statler Hotel, Thursday evening. Those at the speakers' table included: Ben F. Fairless, president, Carnegie Illinois Steel Co.; Dr. Zay Jeffries, Aluminum Co. of America, Cleveland; Dr. Albert Sauveur, William R. Chapin, Robert S. Archer, Edgar C. Bain, the new president, and Mayor Harold H. Burton. The principal speaker was H. V. Kaltenborn, radio commentator. Mr. Fairless spoke briefly.

The presentation of the Albert Sauveur award to Mr. Chapin was made by Dr. Jeffries. Mr. Chapin expressed his deep appreciation for the award and spoke enthusiastically of the metal exhibit with which he was greatly impressed and having in mind the outstanding developments in the metal-working industry as shown in the exhibits, he said he hoped "economic royalists had done some good after all."

A native of Vermont, Mr. Chapin was graduated from the Alabama State Normal School and attended the University of Alabama for two years. After leaving college his first employment was with the Cleveland Twist Drill Co., Cleveland. He left that company to become connected with E. C. Atkins & Co., Indianapolis, with which he has been associated 27 years and of which he is director of research. The award of the Sauveur medal to him was in recognition of research work which led to his discovery in 1914 that there is a critical temperature point in the heat treatment of steel at which the metal may be safely straightened.

New officers of the American Society for Metals are as follows: President, Edgar C. Bain, assistant to vice-president in charge of metallurgy and research, U. S. Steel Corp.; Vice-president George B. Waterhouse, professor of metallurgy at the Massachusetts Institute of Technology. New trustees to serve two years are: Ralph L. Wilson, Timken Steel & Tube Co., Canton, Ohio, and Owen



DR. ALBERT SAUVEUR (left) is an interested onlooker as Dr. Zay Jeffries, recipient of the Sauveur award for 1935, greets William R. Chapin (right), research director of E. C. Atkins & Co., Indianapolis, who received the 1936 award.

W. Ellis, Ontario Research Foundation, Toronto.

W. P. Woodside, Climax-Molybdenum Co., Detroit, who is treasurer, and William H. Eisenman, the secretary of the Society, continue in the same capacities, having been elected last year for a two-year period.

The sessions of the American Welding Society were largely attended and much interest was shown in the practical application of developments described in the technical papers. The Society had charge of the sessions during the first three days. The fourth day was under the joint auspices of the Welding Society and the American Society of Welding Engineers, and the welding practice symposiums, which were held on the last day, were under the direction of the latter society. Members of the Welding Society visited the plants of the Lincoln Electric Co., Wellman Engineering Co. and other Cleveland companies and the General Electric Institute.

The Samuel Wylie Miller Memorial Medal of the American Welding Society was awarded to Henry M. Hobart, consulting engineer, General Electric Co., Schenectady. The award was in recognition of Mr. Hobart's outstanding services in the advancement of welding research. Mr. Hobart developed mercury arc rectifiers and is an authority on arc welding, design of dynamo electric machinery, insulation and standardization. He is active in promoting international and national electrical standardization and is a member of the U. S. National Committee of the International Electro-Technical Commission.

A founder and director of the American Welding Society, he is

OVER 800 guests attended this banquet of Hotel, Cleveland, the evening of Oct. 22. radio commentator, who described the probable future European political maneuvers. Ben F. Corp., also

also a former vice-president of the American Institute of Electrical Engineers and is a fellow of the American Association for the Advancement of Science as well as a member of other engineering societies. He is the author of a number of books on electrical subjects.

Born in Boston in 1868, Mr. Hobart was graduated from the Massachusetts Institute of Technology in 1889 and during the next five years was connected with the Thompson-Houston Co. and later with the British company of the same name. He spent three years in Berlin as a consulting electrical engineer and eight years in independent consulting practice in London. He has been a consulting engineer for the General Electric company since 1911.

New officers of the American Welding Society are as follows:

President, A. E. Gibson, executive vice-president, Wellman Engineering Co., Cleveland.

Senior vice-president, E. R. Fish, chief engineer boiler division, Hartford Steam Boiler Inspection & Insurance Co.

Divisional vice-president, H. C. Boardman, director of research, Chicago Bridge & Iron Co.

Divisional vice-president, J. H. Zimmerman, development engineer, Linde Air Products Co.

Divisional vice-president, R. D. Thomas, president of R. D. Thomas & Co., Philadelphia.

Treasurer, Charles A. McCune (re-elected), secretary of Magnaflux Corp., New York.

Technical secretary, William Spraragen.

Secretary, Miss M. M. Kelley.

W. R. Barclay, president, British Institute of Metals, was one of the speakers at the annual dinner of the American Society for Metals at the Statler The principal speaker was H. V. Kaltenborn, influence of a successful Spanish revolution on Fairless, president of Carnegie-Illinois Steel spoke briefly.

the American Institute of Mining & Metallurgical Engineers, Wednesday evening.

The Metal Exposition attracted a large attendance of visitors who showed keen interest in the displays which were of an educational character and covered a wide range of materials, equipment and processes. Included in the exhibit was considerable mechanical equipment that was being shown for the first time. Exhibitors reported a good volume of sales of machines and other equipment.

Many of the leading steel companies had exhibits and it was generally agreed that these exceeded in scope and attractiveness all previous displays at the Metal Exposition. Steel makers showed not only full lines of their products, but in many cases finished products made from their steels to show the deep drawing, forging, finishing and other qualities of the steel. Various applications of alloy and high strength steels were exhibited and stainless steel was featured in attractive displays of table ware and other household equipment.

The voice of a robot fabricated of stainless steel explained the manufacturing processes of the U. S. Steel Corp., a talking picture of the making of steel by Bethlehem Steel Co., and a motion picture of steel making at the Great Lakes Steel Corp. A model of a tilting type open-hearth furnace exhibited by the Jones & Laughlin Steel Corp. showed the tapping of a heat of steel. A 10-gage stainless steel sheet 84x240 in., said to be the largest ever made, and intricate stainless steel etchings were exhibited by the American Rolling Mill Co.

Colored cold rolled strip is a new product that was shown by the Acme Steel Co., Chicago. The Colorstrip, as it is designated, is made from 8-in. wide, 0.050 gage cold strip with either bright or galvanized surface to which is applied a coating in various colors and is supplied in coils. This material, it is stated, can be formed into almost any shape without chipping and is designed for fabrication into decorative moldings, automobile moldings, bottle caps and other products.

A new process of selective surface hardening by electrical induction, which was given its first public demonstration, attracted a great deal of interest. This, which has been developed by the Ohio Crankshaft Co., Cleveland, and is designated as the Tocco process, permits the surface heating and quenching of cylindrical sections with the hardened surface kept within close limits as to area and depth. The first application of the process has been the hardening of crankshafts of internal combustion engines at the bearing surfaces and this application of the process was demonstrated.

After forging, the crankshaft is cooled, this cooling resulting in the necessary normalizing. Without further heat treatment, it is machined and rough ground.

For hardening a high frequency, current at high voltage is transformed into low voltage with high amperage. The current passes into inductor blocks which surround

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WITH 212 companies displaying their wares last week's eighteenth National Metal This view of the upper level only partially of some of the larger booths. The picture gas

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but do not touch the bearing area that is to be hardened. The inductor block current induces a current in the surface of the metal and this induced current is the heating factor. When the area to be heated has been subjected to the high frequency current for the correct length of time, the electrical circuit is opened and the heated surface is quenched by a spray from a water jacket built into the inductor block.

After the bearings are hardened a shaft is drawn at low temperature to remove strains and is finish ground.

In testing equipment, a new, high speed R. R. Moore rotating beam fatigue testing machine was shown by the Baldwin Southwark Corp., Philadelphia. This machine has a rated speed of 10,000 r.p.m., but tests at the Exposition showed a considerably higher speed. This speed compares with a speed of 1750 r.p.m. for a previous type machine. This company also showed for the first time a new Universal hydraulic testing machine equipped with a large load indicating dial that takes the place of three small dials and provides two ranges on the one dial.

A new feed fatigue testing machine of the fixed deflection type for testing sheet specimens, designed to give uniform stress over a considerable portion of its cantilever length, was displayed by G. N. Krouse, New Kensington, Pa. For fatigue testing of wire Mr. Krouse showed a new high speed fatigue machine provided with a wire testing adapter having a speed range of 500 to 12,000 cycles per min.

Exhibits of welding and cutting equipment were very complete and several new developments were shown. There was a wide variety of flame cutting equipment, including automatic flame cutting and torch hardening equipment. There were also numerous displays of welding rods of all types.

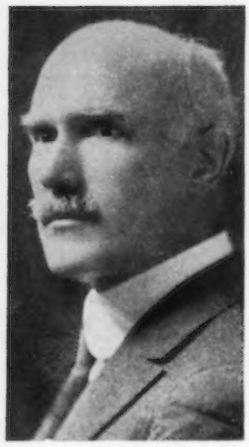
A method of automatic arc welding with the complete protection of the weld metal that was developed by Una Welding, Inc., Cleveland, was demonstrated by that company. The welding rod is protected by a combination of coating on the rod and with tape which is wrapped around the rod just before it reaches the arc. This permits the replacement of bare rods formerly used with automatic welding heads with tape coated rods and extends the use of the shielded arc to automatic continuous welding.

A new automatic welding head using coated electrodes was exhibited by the Harnischfeger Corp., Milwaukee. This head is operated by remote control and is said to permit the use of higher current with welding heats as much as 60 per cent above those used with hand machines.

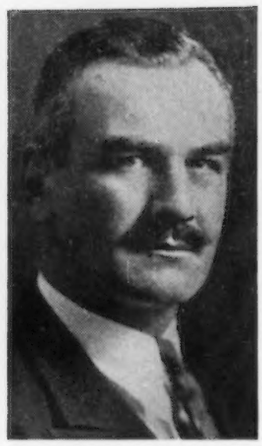
A new dual continuous control for the shielded arc SAE welder was exhibited in operation by the Lincoln Electric Co., Cleveland. By making possible the selection of any degree of arc penetration for each and every current setting, the new control, it is pointed out, provides a distinct advancement in welding technique. Both voltage

and processes over 165,000 sq. ft. of floor space, Congress was the most successful on record. reveals the attractive and instructive aspects above shows one aisle of exhibits in the section.

A. E. GIBSON, vice-president, Wellman Engineering Co., Cleveland, and president-elect, American Welding Society.



E. R. FISH, chief engineer, boiler division, Hartford Steam Boiler Inspection & Insurance Co., and senior vice-president, American Welding Society.



J. H. ZIMMERMAN, development engineer, Linde Air Products Co., and divisional vice-president (New York and New England), American Welding Society.

H. C. BOARDMAN, director of research, Chicago Bridge & Iron Works, and divisional vice-president (Middle Western), American Welding Society.

and current of the welder can be varied in a continuous sequence of fine increments.

Equipment for multi-layer oxy-acetylene pipe welding was demonstrated by the Air Reduction Sales Corp., New York. This is designed to produce welds on heavy wall pipe designed for severe service. This company also exhibited a new surface flame hardening machine for hardening gears and flat surfaces.

A new portable shape cutting machine was one of the exhibits of the Linde Air Products Co., New York.

Several metal cutting machines were shown in operation and attracted a great deal of interest. The general trend in machines of this type is toward faster operation. A new semi-automatic cutting machine for cutting with a saw light wall metal tubing and other light sections was demonstrated by the DeWalt Products Corp., Lancaster, Pa. This has a capacity for cutting tubing up to 1½ in. diameterat the rate of 32 cuts per min. The feed in automatic.

A continuous sawing and filing machine for die work was displayed by Continental Machine Specialties, Inc., Minneapolis. In the base of this machine is a brazing unit for joining the ends of a band saw after the saw is inserted in the work. What is said to be the largest hack saw machine ever built was shown in operation by Armstrong-Blum Mfg. Co., Chicago.

J. P. GILL

THE Campbell Memorial Lecture delivered by Mr. Gill dealt with carbide segregation and grain size of high-speed steel.

S. L. HOYT

IN an A.I.M.E. paper on transverse notch bar tests, Dr. Hoyt discussed practical questions.

GEORGE A. MAURATH

CHAIRMAN of the entertainment committee of the American Welding Society.

EDGAR C. BAIN

NEWLY elected president of the A.S.M. and assistant to the vice-president in charge of research, United States Steel Corp.

R. D. THOMAS, president, R. D. Thomas & Co., Philadelphia, and divisional vice-president (Middle Eastern), American Welding Society.

C. A. McCUNE, secretary, Magnaflux Corp., New York, and treasurer, American Welding Society.

W. SPRARAGEN, technical secretary, American Welding Society.

HENRY METCALF HOBART, consulting engineer, General Electric Co., and recipient of Samuel Wylie Miller Memorial Medal.

This has a capacity of 18 x 18 in. and employs a new principle of roll stroke blade reciprocation.

Exhibition of electric furnace equipment included atmospheric control conveyor type copper brazing furnaces by the General Electric Co. ((in operation), and by C. I. Hayes, Inc., Providence, R. I. Leeds & Northrup Co., Philadelphia, showed a new Homo tempering furnace. This is smaller than the standard Homo furnace, being designed for tools and die tempering.

Gas furnaces and burners were shown by a number of manufacturers. A rotary forge furnace for heating stock under controlled atmosphere was exhibited by the Gas Machinery Co., Cleveland.

The use of zinc base die castings in product manufacture was shown in an interesting exhibit by the New Jersey Zinc Co. Among the more intricate castings shown was a gear case for a Universal winding machine weighing 18 lb. and replacing an assembly of castings. Another was a lid for a high speed industrial sawing machine having a speed of 7000 stitches per min., this lid having heretofore been made of numerous small parts. Oil line inserts of tubular brass are cast in the piece. Zinc die castings used in the 1937 Buick car amounting to 60 lb. were shown and alongside of them were about a dozen similar castings which were all that were used in the same car ten years ago.

Heat corrosion and abrasive resisting alloy castings were featured in attractive displays.

Exhibits of coating processes and materials including a working demonstration of electrolitic plating with cadalyte by the Grasselli Chemical Co. and a duPont demonstration of a bright zinc barrel plating process.

New metalographic equipment for research work was shown by the Bausch & Lomb Optical Co., Rochester, N. Y. A tungsten lamp furnishes the light source. This equipment is so designed that the same instrument will do light, dark and polarized light work.

A new high speed automatic tapping machine was shown by the George Scherr Co., New York. A feature claimed for this machine is that the breaking of taps is eliminated.

ROBERT S. Archer (left), retiring president of the A.S.M., and Edgar C. Bain (right), president-elect, congratulate J. P. Gill for his valuable and informative Edward DeMille Campbell Memorial Lecture.

ABSTRACTS of A.S.M. PAPERS

Tocco Hardening Attracts Great Interest —Krivobok Presents Valuable Stainless Steel Data—Ameen Reviews Dimension Changes in Tool Steels.

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THE attendance at the eighteenth National Metal Congress in Cleveland last week and the enthusiasm exhibited at the technical conventions may be considered as substantial evidence of the country's industrial recovery. A record attendance was registered at the exposition and, even more encouraging, the attendance at most of the technical sessions of the American Society for Metals greatly taxed the capacity of the auditoriums provided for the lectures.

The schedule of papers during last week's five-day session was undoubtedly the most inclusive and probably the most educational ever prepared by the A.S.M. since its initial venture as a sponsor of an exposition in 1919. At that time the A.S.M. was known as the American Steel Treaters' Society, and, even now, the society has a tendency to emphasize the heat treatment of steel notwithstanding its change in name.

Of the 50 separate technical manuscripts presented from Monday to Friday of last week, many dealt with fundamental research, there were seven educational lectures, sessions on heat treating, grain size and physical properties, four papers on the melting of steel, a symposium on the plastic working of metals, three papers on the use of X-rays and three papers dealing with fundamental data on testing phenomena. In this enormous amount of technical matter, it is obvious that only a small part can be segregated and treated in the following paragraphs. Inasmuch as the heat treating sessions were particularly popular, and, because many readers of THE IRON AGE are specifically interested in this subject, the three papers in this group will be given special consideration.

Tocco Hardening

"Differential Hardening by Induction," by M. A. Tran, Park Drop Forge Co., and W. E. Benninghoff, Ohio Crank Shaft Co., attracted great interest, partly because the equipment was in actual public operation at the show for the first time.

The new Tocco (abbreviation of The Ohio Crankshaft Co.) proc-

ess is a procedure whereby metal surfaces are hardened very quickly, inexpensively and with accurate and uniform results.

The Tocco procedure currently is confined mostly to hardening the bearing sections of crankshafts and sections of other symmetrical automobile parts. It is expected, however, that this method of differential hardening will soon branch out into many other directions.

As pointed out by the authors, industry's search for a wear resistant metal surface combined with a resilient core has led to many developments. Carburizing, being many centuries old, probably was the first of many methods of producing a hard surface on a soft metal core. More recently, cyaniding followed carburizing, and nitriding, Chapmanizing and, to some extent, chromium plating subsequently followed in order as industry searched for processes suitable for particular applications.

All of these methods require the addition or absorption of other elements to the surface to be hardened. Some methods require time cycles as long as 90 hr., and also the use of high temperatures. Distortion often results, many times the products require many subsequent grinding or finishing operations, and, finally, it has become evident that it is not economical to heat 1000 lb. of metal, for instance, in order to harden 10 lb.

Thus industry has become more and more convinced that a process is needed to harden metal surfaces differentially but still not require the addition or absorption of another element. Likewise, it is important that the entire operation can be accomplished in a very short time. The first approach to this end was the use of flame hardening (Shorter process, etc.) in which a traveling flame heats certain parts and these parts are immediately hardened by pressure water emerging from directly beneath the burner tip. The authors pointed out, however, that the use of this procedure on crankshafts often resulted in distortion, and furthermore, was neither uniform nor predictable.

The Tocco process, as described by the authors, is a procedure whereby the part to be treated is heated very quickly and accurately to above the AC_3 point by high frequency induced current and thereafter immediately quenched by means of pressure water streams. This equipment permits very accurate control of temperature as to location and depth, and the heating is so rapid as to prevent undesired heating of adjacent areas, especially fillets on parts such as crankshafts.

The power output of Tocco equipment may be regulated automatically or manually at the operator's discretion. High frequency current at high voltage from the frequency charger is transformed into low voltage with high amperage through a water cooled transformer from which it passes into inductor blocks placed around the surface to be hardened.

An inductor block acts as the primary coil of a transformer inducing a current in the magnetic object to be heated, through a minimum air gap, which has been predetermined and is mechanically maintained. This circulating current induced in the surface of the journal to be heated is the prime heating factor. Heat is, therefore, generated in the steel itself.

The heating is the result of two losses in the steel; first, hysteresis loss, and, second, eddy current loss. Both of these heating effects are at their maximum at the start of the heating cycle as, at the critical point, there is no hysteresis loss and eddy current loss is greatly reduced. Thus the surface of

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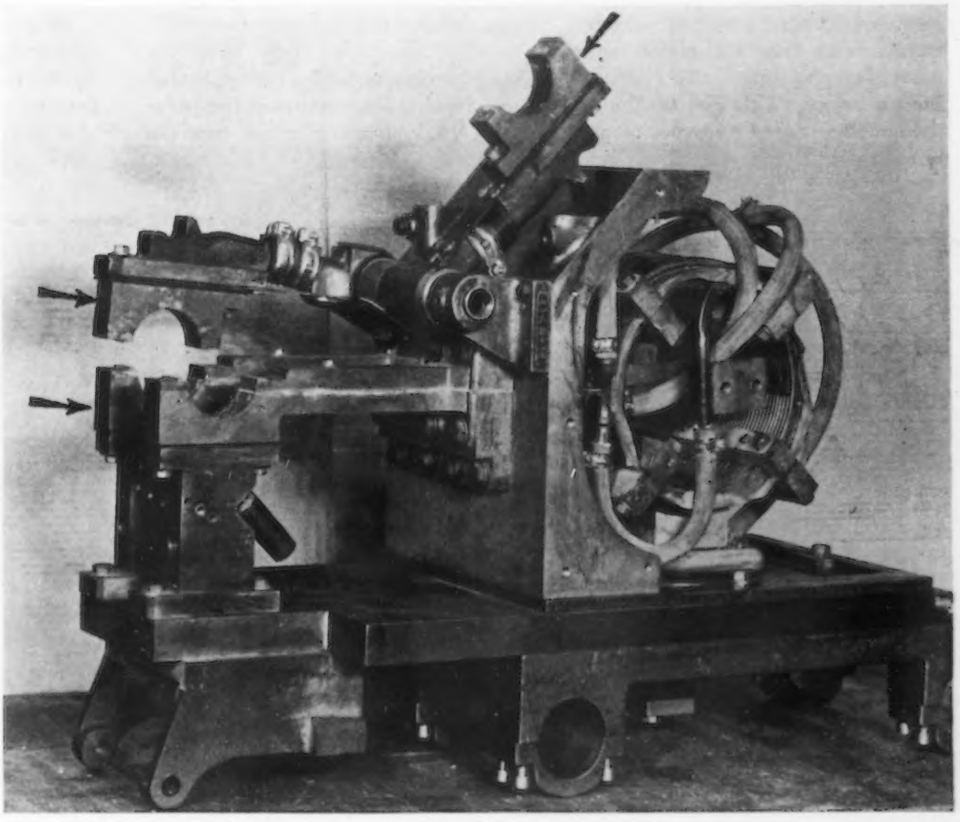

FIG. 1—A Tocco machine for differentially hardening automobile crankshafts. The inductor blocks (as indicated here by arrows) fit over the bearing faces of the shaft. Note the small holes in the blocks through which cooling water is squirted.

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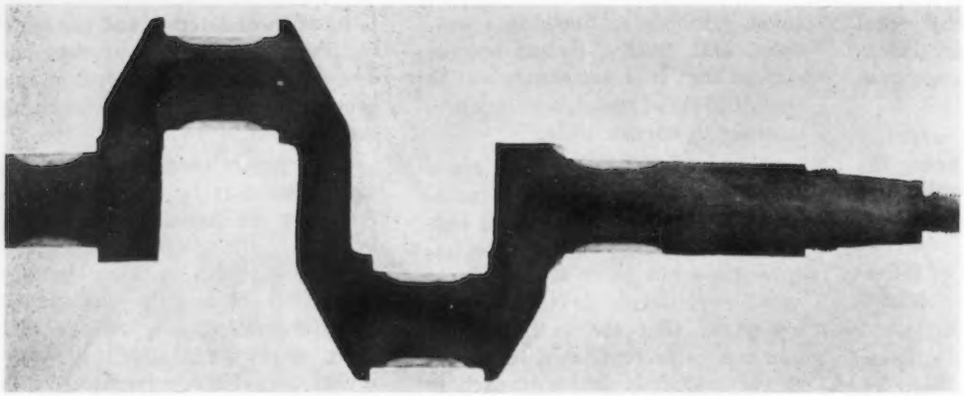

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FIG. 3—A refrigerator crankshaft hardened differentially. Note how how the thrust-face and bearing are hardened, leaving the fillet unaltered and soft. The total time required to do this job was 13 sec. at an average power imput of 110 kw.

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the steel cannot be overheated even if exposed twice as long as required, since further application of the current only serves to drive the heat in toward the center of the piece being heated.

Built into the inductor block and integral with it is a water jacket. Instantaneous quenching is accomplished by pressure spraying through orifices in the inner faces of the blocks. A picture of a Tocco hardening machine with two inductor blocks is shown in Fig. 1. In operation, the two parts of the block fit down over the part to be treated. The contour of this inductor block controls the contour of the particular surface to be hardened. The k.v.a. seconds required to produce a desired hardened area is estimated from graphs compiled from previous experiments, with due allowance being made for the mass effect of adjacent areas. This calculation is then substantiated by experimentation. In Fig. 2 is shown a completely automatic Tocco machine. The authors of the paper on differential hardening are demonstrating the method of operation.

In using the Tocco machine on crankshafts, preference is had for steels having a McQuaid-Ehn rating of 6-8, with only a slight degree of abnormality. This slight abnormality together with the fine grained steel produces a martensitic structure in the hardened zone without the customary martensitic cracking.

The authors, Tran and Benninghoff, stated that to completely insure the success of this process, particularly in producing a good bond, the steel used should be either previously heat treated to a predominately sorbitic structure or normalized to obtain a grain size that approaches the heat treated structure. This structure may be obtained by an accelerated cool from the normalizing temperature. The heating cycle used in the Tocco process is so rapid that it permits little or no diffusion time, which necessitates having the steel in the proper condition before hardening. It is desirable that the steel used be quite free from surface imperfections and the micro-constituents should show a minimum tendency toward segregating into bands.

After hardening, the entire shaft is drawn at a low temperature to completely remove all stresses. A finish grind to remove 0.020 to 0.030 in. of metal purposely left on the diameter before hardening completes the shaft. It is then subjected to a thorough examination for surface defects by means of the Magnaflux process and checked 100 per cent for hardness, which is held to a minimum of 56 Rockwell "C."

There are a number of typical metallurgical characteristics of hardening by induction. The customary surface decarburization and grain growth does not occur due to the rapidity of the heating

TABLE I

Chemical Analysis of Crankshaft Steels That Can Be Tocco Hardened

	Carbon	Mn	P Max.	S Max.	Nickel	Chrome	Moly.	Si Max.	Cu
S.A.E. No. 1045	0.40 to 0.50	0.60 to 0.90	0.040	0.050	...	...	...	0.030	...
S.A.E. No. 1050 modified	0.45 to 0.55	0.70 to 1.05	0.040	0.050	...	0.25 Max.	...	0.030	...
S.A.E. No. T1345	0.40 to 0.50	1.60 to 1.90	0.040	0.050	...	...	...	0.030	...
Mola.	0.588	1.16	0.014	0.015	Nil	0.21	0.15	...	...
S.A.E. No. X4340	0.35 to 0.45	0.50 to 0.80	0.040	0.040	1.25 to 1.75	0.70 to 0.90	0.15 to 0.25	0.030	...
S.A.E. No. 4140	0.35 to 0.45	0.50 to 0.80	0.040	0.040	...	0.80 to 1.10	0.15 to 0.25	0.030	...
S.A.E. No. X3140	0.35 to 0.45	0.60 to 0.90	0.040	0.040	1.10 to 1.50	0.70 to 0.90	...	...	...
Foreign	0.382	0.38	0.011	0.021	2.74	0.88	...	...	...
Foreign	0.32 to 0.38	0.30 to 0.50	0.020	0.030	2.50 to 3.00	0.80 to 1.00	...	...	...
Foreign	0.294	0.25	0.008	0.008	3.91	1.07	0.51	...	...
Foreign	0.350	0.63	0.008	0.009	0.65	1.06	0.95	...	...
Foreign	0.516	0.59	0.018	0.037	0.96	Nil	Nil	...	...
Foreign	0.376	0.74	0.029	0.039	0.08	0.33	Nil	...	...
Cast alloy	1.198	0.66	0.019	0.033	0.19	0.42	Nil	0.90	1.82
Zee metal	2.50	0.93	0.170	0.095	...	...	...	0.94	...
Graphitic Steel	1.50	0.40	0.015	0.020	...	...	...	0.80	...

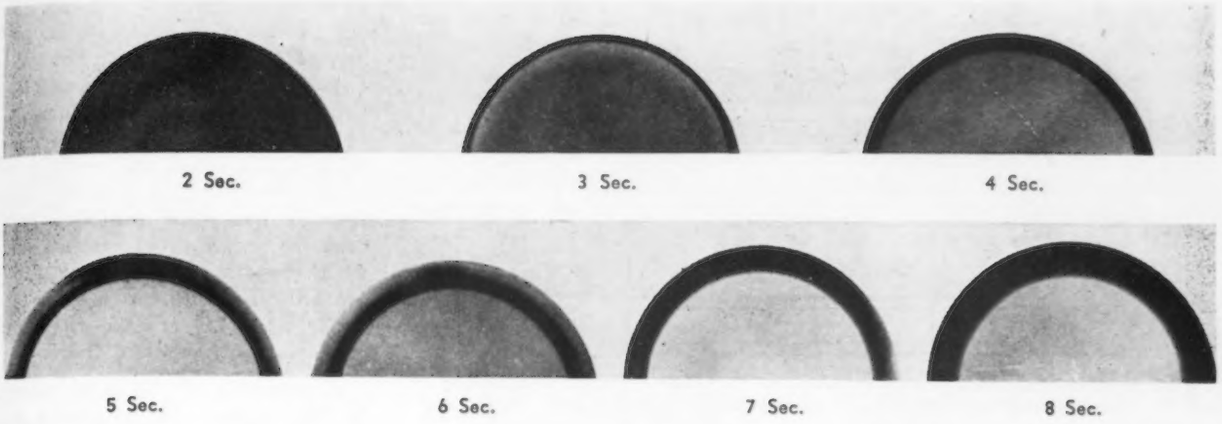

FIG. 4—Transverse sections of specimens taken from a bar of SAE 1045 steel, showing the penetrations obtained by using a constant power imput with different heating times.

cycle, which is measured in seconds and tenths of seconds. The resulting martensite is extremely fine grained, even at 1000 diameters and the usual large needles are absent, thus producing exceptional ductility throughout the hardened area. The combination of instantaneous pressure quenching and split second heating cycle produces a bond (that is, the cohesion between the hardened areas and the core) which is largely troostitic, blending gradually into the core structure without any marked precipitation of free ferrite in or below the gradation zone. Core structures remain entirely undisturbed after surface hardening by the Tocco process, since the extremely short time cycle combined with the skin effect peculiar to high frequency current does not permit the heat to penetrate into the core.

As a demonstration of the high degree of precision by hardening differentially, consider Fig. 3, which shows a longitudinal section of a bearing hardened by the Tocco method. Note the sharpness and the uniformity of the surface hardened area and the unaltered condition of the fillet and major part of the bearing. The manner in which the depth of hardness varies with time is pictured in Fig. 4, and a total list of all the alloys so far successfully hardened in the Tocco machine is listed in Table 1. A few foreign steels are included.

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FIG. 2—This automatic Tocco hardening unit is shown here with a crankshaft in place. Power is automatically applied to the bearing and maintained at a constant value, then released, after which the quenching medium is applied automatically at proper pressure and for a correct time interval. The authors of the paper on differential hardening are also shown here—M. A. Tran on the left, and W. E. Benninghoff on the right.

Continuous Gas Carburizing

The method of carburizing by gas in which the work enters at

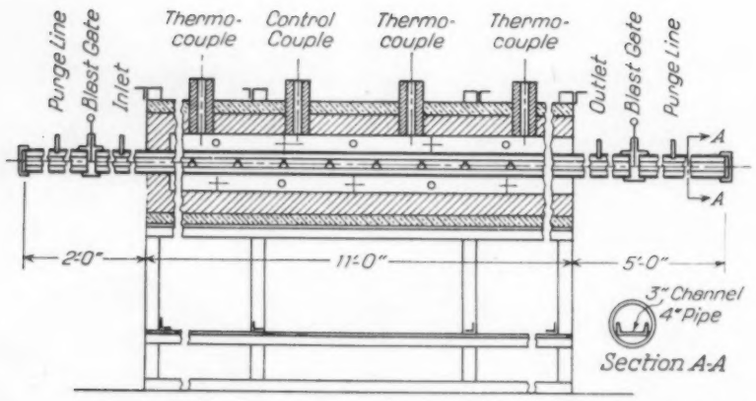

FIG. 5—Laboratory furnace used to determine the effect of various atmospheric conditions upon the process of continuous gas carburizing.

one end and discharges at the other end of an elongated muffle chamber was proposed by R. J. Cowan in 1931. It has been successful in commercial use since that time. In the interval from 1931 to the present date, a vast amount of information regarding the operation of these units has been accumulating. Much of these data were correlated and described last week in another paper by R. J. Cowan, of the Surface Combustion Corp., and, in addition, the article summarized results obtained in a group of experiments, using, in turn, city gas, cracked gas and natural gas under various atmospheric conditions. All of this experimental work was undertaken to determine the effect of various atmospheric conditions upon the process of continuous gas carburizing.

In the experimental work a small laboratory furnace was set up which was adapted for continuous operation. The material could be carburized in a controlled atmosphere and allowed to cool slowly before removing into the air. The parts to be carburized were placed in steel trays, which were charged at one end of the muffle, moved progressively along the furnace length and discharged at the opposite end of the muffle. The details of the furnace used are shown in Fig. 5.

According to Mr. Cowan, this furnace was operated continuously for a considerable period of time for the carburization of samples of steel which were then polished and examined microscopically in order to study the depth and character of the carburized case obtained under different conditions. A SAE 1020-90 Mn steel was used for these studies. The time of temperature was adjusted so as to produce on these specimens a rather deep case of approximately 0.070 in. This was done in order to avoid conclusions based on shallow case depths. There were 20 trays in the furnace at one time each with a test specimen; therefore, when it was decided to make a change of any kind there was a period of time when certain of the samples within the furnace were subjected to both treatments. In the graph in Fig. 6 an attempt is made to show by means of shaded areas and the cross hatch lines just where these transition periods occur between tests.

The following series of tests were run by the author: (1) city gas only, concurrent flow of 11 cu. ft. per hr.; (2) city gas only, flow of 40 cu. ft. per hr.; (3) city gas only, counterflow of 11 cu. ft. per hr.; (4) natural gas with flue gas; (5) cracked gas with propane dehydrated by activated alumina; (6) same as (5) without dehydration; (7) cracked gas with propane, dew point 60 deg. F.; (8) cracked gas with propane, dew point 75 deg. F.; (9) cracked gas with propane, alloy trays; (10) cracked gas with propane, alloy muffle, and (11) cracked gas with propane, using oxidized trays.

At the base of the chart shown in Fig. 6 there is designated by appropriate numbers the different series of tests given above. The transition zones between tests are marked out as already described. The numbers shown represent individual specimens each of which was taken from a single tray. The carburized depth of each is recorded by a graph placed above each specimen number. The temperature was held at 1750 deg. F. (955 deg. C.).

The author pointed out that a number of unexpected results were found in this program of tests. He was surprised in the first place to find that a higher flow of city gas caused a lowering of the case depth. He was also surprised when it was found that a completely dehydrated gas was not found to be an active carburizing gas and when the addition of moisture to

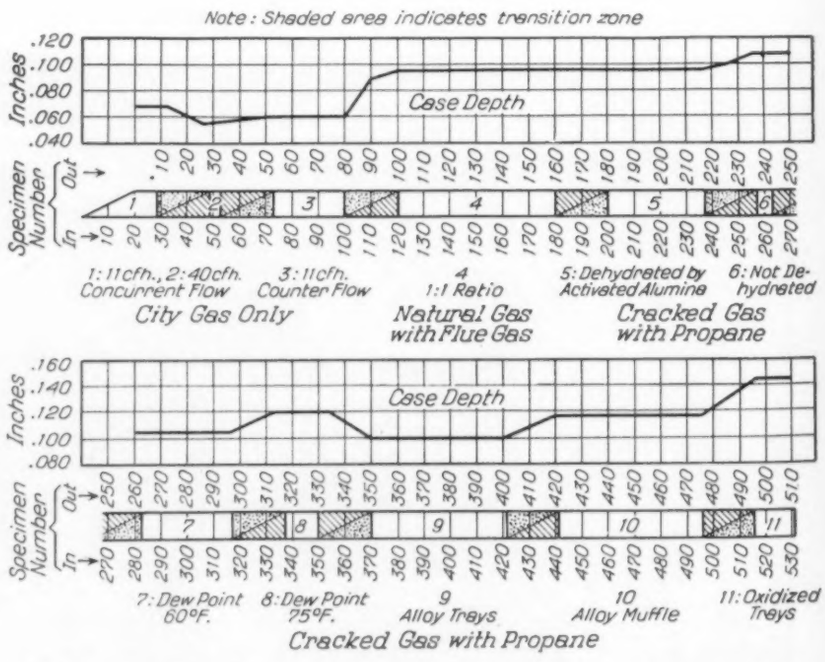

FIG. 6—The effect of various atmospheric conditions on the case depth in continuous gas carburizing.

this gas raised the carburizing efficiency. The effect of alloy on the carburizing reaction was well known and expected, but it was believed that the use of alloy in the muffle would have about the same effect as alloy in the tray. This proved to be wrong; for the effect of alloy in the muffle was found to be rather slight. The use of oxidized trays or of material covered with mill scale is known to have an effect upon the carburizing rate. The author, however, did not believe the effect was as great as that indicated.

In concluding his paper, the author listed the following five results shown by the laboratory tests: (1) The matter of gas flow is important and should be carefully established for each installation; (2) the carburizing gases do not need to be thoroughly dried but will function efficiently in the presence of considerable water vapor; (3) alloy trays containing 35 per cent nickel and 15 per cent chromium have an effect upon the carburizing reaction which must be taken into consideration (experience has shown that after having passed through the furnace several times and having been thoroughly carburized this alloy effect is greatly reduced); (4) the alloy that is used in the muffle has but very slight effect, if any, upon the carburized material, and (5) the presence of mill scale upon work to be carburized accelerates the carburizing rate. This observation has been confirmed in practice.

An excellent discussion of the results obtained by Mr. Cowan was given by H. W. McQuaid of Republic Steel Corp. It was emphasized by Mr. McQuaid that his experiences have shown that the rate of flow is a very important factor in obtaining the maximum rate of carburizing, whether in gas or in a compound. Also, his experiences would indicate that a maximum speed of flow of gas over the work is usually restricted commercially by questions of expense and cost of circulation. Mr. McQuaid checked the maximum rate of flow indicated in Mr. Cowan's paper and arrived at a rough figure of 60 in. per min. through the empty tube and, depending upon the size of the sample, this figure would, of course, be considerably increased by the test pieces. Mr. McQuaid was of the opinion that a more accurate indication of the effect of speed of the gases over the work might have been found if the thermo-couple were actually in contact with the test piece in the tube, so that the cooling effect of the gas on the surface of the work might be known. This is a very important consideration and determines in many commercial applications the maximum rate of flow of the carburizing gas.

FOR a number of years Mr. Cowan has conducted extensive experiments in the interest of gas carburizing and has expended a great deal of effort to develop a practical production process. For the past two years he has been engaged as a research metallurgist for the Surface Combustion Corp., Toledo, prior to which he spent 26 years in malleable foundry and steel making research.

Mr. McQuaid was also of the opinion that there would be considerable value in a study in which circulation of the gases in the carburizing retort was obtained by a fan in the retort itself, so that instead of fresh gas being admitted at the rate indicated, the hot gases would be recirculated to prevent stagnation of any gases in recesses, etc., in the work.

According to some of the experiences of Mr. McQuaid, there is a maximum rate at which the surface austenite can absorb carbon at any given temperature, and, also, a diffusion rate which is fixed by the temperature so that all that can be expected by recirculation of gases, etc., is to approach this maximum uniformity at all parts of the exposed surface of the work.

Mr. Cowan's observations in regard to moisture checked with Mr. McQuaid's experiences as also did the conclusion in regard to scale upon the work to be carburized.

Continuous Heat Treating of Cold-Rolled Strip

With two large size commercial continuous heat treating furnaces in operation on cold-rolled strip, the general subject of continuous heat treating is one which latterly has attracted much interest. A general review of the subject as well as an examination of the results obtained in the first experimental unit were described in a paper entitled the "Continuous Heat Treatment of Cold-Rolled Strip," by N. P. Goss, Cold Metal Process Co., and T. B. Bechtel, Electric Furnace Co.

It was pointed out that the past decade has seen tremendous advancement in the production of low-carbon steel in strip form, that is, in long continuous lengths. The demand for such strip, particularly of the "broad" variety or generally speaking, in widths above 24 in. and up to 72 in. or 84 in., has come primarily from automotive users.

Such production has become possible in the main by two major developments, which, at least from the standpoint of commercial application, may be considered as having been brought out during the 1926-1936 period. These two developments were the continuous hot strip mill and the continuous cold rolling mill. In the processing of this strip, there are usually required some heat treatment at one or more points. In general this treatment consists of process anneals to put the material in shape for further cold rolling and final heat treatments in the form of annealing or normalizing, or sometimes a combination of both, to make available the proper physical and structural conditions for stamping or other fabrication into the final product.

As shown by the authors, conventional annealing practice may vary in that the strip may either be annealed in coil form or sheared and then annealed in the flat, and, at the present time, is principally

accomplished in batch type furnaces of one form or another. Normalizing may be considered fundamentally as a continuous furnace operation and is so carried out in most mills, with the material generally cut into short lengths and carried between rider and cover sheets in an ordinary direct fired furnace.

However, it would seem quite logical that, having accomplished the rolling of the strip in long lengths continuously, it would seem to be the best practice to heat treat in a like manner. That is, the coil would be unreeled at one end of the furnace, passed continuously through the equipment and recoiled at the discharge end.

After the perfection of a cheap process for producing a neutral atmosphere for furnaces in 1932, the Cold Metal Process Co. installed a furnace for bright annealing cold-rolled strip and electrical (high silicon) strip in both the hot and cold-rolled forms. The first experimental furnace was installed in 1933, and the construction and operation of this furnace was described in THE IRON AGE, Feb. 21, page 23, 1935.

Suffice to say, the furnace is heated electrically; the effective heating chamber measures 2½ ft. x 16 ft., is powered at 120 kw. and has a productive capacity of eight to ten tons per day of low carbon steel strip. The cooling chamber, which is of the sectional water-jacket type, is about 45 ft. in length. The conveying equipment consists of a series of heat-resisting, nickel-chromium alloy rolls in the heating chamber and brass rolls in the cooler section of the cooling chamber.

Two large size commercial furnaces of this general type have been built by the Westinghouse Electric & Mfg. Co. One of these, now in operation at the Ford plant, has an overall length of 250 ft. and heat treats 18-gage strip at a maximum speed of 27 ft. per min. Descriptions of this furnace and data dealing with the heating and cooling temperatures and ranges were considered in detail on page 45-A of the Oct. 1, 1936, issue of THE IRON AGE.

The product furnished by this method of heat treatment, according to Goss and Bechtel, is characterized by uniform grain size. By heating strip to a temperature above the A_3 point, coupled with the proper time at temperature, steels having unusual deep drawing properties were developed. Several examples of steel with this deep drawing characteristic are shown in Fig. 7. The one view in the middle of Fig. 7 shows a cup 0.016 in. in thickness made in one cup and one draw without annealing. In the production of this part it was absolutely necessary that the cup draw uniformly, without ears and that there be no evidence of tearing at the bottom edge. The deep drawing shown on the left was made from a round blank 0.022 in. thick and was made with one cup and two drawing operations with no intermediate anneals. The piece on the right, Fig. 7, was made possible for the first time in deep-drawing steels by continuous furnace heat treatment. Note the perfect rim, which was important due to the small projections necessary on the upper edge.

The authors pointed out that grain size and yield point are related. In steel normalized in the continuous furnace, the finer the grain the higher the yield point and the elastic limit, and the larger the grain the lower the yield strength for any given material. Therefore, when a stamping is to have extreme strength a fine structure is desirable, whereas for deep drawing operations a larger grain size is naturally preferred.

Stainless Alloys

A splendid contribution to the literature covering austenitic stainless steels of the chromium-nickel variety was presented by V. N. Krivobok of the Carnegie Institute of Technology and Allegheny Steel Co., and Rush A. Lincoln of the Allegheny Steel Co. The manuscript contained the results of a great mass of experimental work, mostly relating to characteristic data of chromium-nickel steels of high tensile strength resulting from cold working.

In preparation for the experiments, 18 30-lb. ingots were made with a carbon content of approximately 0.05 and 0.015 per cent and with chromium ranging from 17 to 19 per cent, and nickel from 7 to 9 per cent. These ingots were reduced by hot and cold rolling to strip 0.038 in. thick, which was annealed to dissolve any carbides. The effect of composition on the mechanical properties was determined on both annealed strip and strip after different degrees of cold rolling.

The ultimate strength and elongation in both cold-rolled and annealed samples change sharply with composition and appear to be influenced by the stability of the austenite with respect to ferrite formation during the cold work imposed by the tensile test. The authors also found that a correlation of the ultimate strength with the hardness of different alloys showed a variation in the annealed condition that becomes less pronounced with increasing amounts of cold work. Furthermore, bend tests on the annealed and on cold-rolled samples indicate the superiority of the high-carbon alloys for use in forming operations after cold rolling to high tensile strengths.

Of these multitude of factors covered in the experimental work, it is possible at this time only to consider one small portion of the data obtained. For instance, the research dealing with the influence of chromium in alloys containing about 0.14 per cent carbon and 7.25 per cent nickel on the tensile strength and elongation after various amounts of cold work is summarized by the graphs reproduced in Fig. 8. It is evident that chrome has a vast influence on alloys of high carbon as contrasted with the results obtained on low-carbon alloys (brought out in other sections of the paper). It had been found by the authors that in low-carbon alloys of the 7 and 8 per cent nickel series, the tensile strength of fully softened alloys was practically independent of the concentration of chromium: that is to say, a wide latitude in chromium analysis could be permitted without altering tensile properties. In high-carbon alloys, variations in chromium content result in widely different mechanical characteristics, which, furthermore, appear to be intensified by the cold rolling process. This is not surprising; the solid solubility for carbon is exceeded in the alloys under investigation and the deformation of the material is accomplished by the breaking down of pseudo solid solution. The process of breaking down is indeed a complex one involving changes in the nature of the matrix and perhaps influenced by the nature of the deformation. It is rather surprising that the difference in properties should be

maintained — and even intensified as was mentioned — through the rolling process.

With higher nickel content (8 to 9 per cent nickel), it was found that the influence of chromium rapidly diminishes. As in the low carbon series (described elsewhere in the paper), the alloys approach, as has been suggested by the authors, a more stable form and, therefore, attain the properties characteristic of such form.

The authors, Krivobok, Lincoln (and R. Patterson, Jr.), emphasized the fact in the second section of their paper that there is very little printed information available concerning the tensile properties of the austenitic chromium-nickel alloys. Often the opinion has been expressed that the values for tensile strength are fictitious, because the metal hardens while it is tested, that is, cold deformed by the tensile machine. It has already been stated by Mehl and Gensamer, who diligently studied this question, that in cold worked materials the elastic range is very restricted, the yield point is ill-defined and in no portion of the stress-strain curve may an elongation at constant load be found.

With this information in mind, Krivobok and his associates resorted to a method developed by the United States Navy and referred to as "proof stress" for studying the tensile properties of a range of austenitic alloys. The definition of the "proof stress" is as follows: load in lb. per sq. in., which, when released results in a permanent set of no more than 0.0002 in. in 2 in. It was found by the authors that the proof stress of all the alloys considered, in the annealed condition, is low, but, upon cold rolling, it increases more rapidly than the ultimate strength. With 30 per cent cold reduction a proof stress greater than half the ultimate strength resulted in all the alloys studied.

A METALLURGIST for Cold Metal Process Co., Youngstown, Mr. Goss has for years studied the interior structure of metals with X-rays. He was one of the men to help develop technique in continuous furnace heat treating of steel strip, and, in a paper abstracted herein, he describes some of the fundamental data relating to the operation of such furnaces.

The same paper also listed Olsen measurements, indicating the relative drawing characteristics of the annealed alloys.

An excellent discussion of the Krivobok paper was presented by Russell Franks, research metallurgist of the Union Carbide & Carbon Research Laboratories. Mr. Franks first pointed out that Mr. Krivobok and his associates had demonstrated that with a given amount of cold work the higher strengths are developed in the less stable steels. That is, these steels are apparently capable of developing higher strength during cold working because of the readiness with which the austenite condition can be altered. It was also brought out by Krivobok that in addition to the higher strength, the less stable chromium-nickel steels exhibit, in many instances, greater elongation than the more stable 18 and 8 type steels, which must be cold worked to a greater degree to give approximately the same strength.

According to Mr. Franks, stability is an extremely important consideration and the extent to which this is varied to obtain high strength is equally important. In other words, how far can the increase in strength be carried by cold rolling without seriously affecting other desirable properties? In order to illustrate this point, Mr. Franks cited the following results: A cold-rolled steel containing 18.95 chrome, 7.07 nickel, and 0.07 carbon exhibited in a standard tensile test, using an 0.505-in. section, a maximum strength of 146,000 lb. per sq. in., a yield point of 135,000 lb. and an elongation of 20 per cent in 2 in. and a reduction in area of 61 per cent. The steel also showed an Izod impact value of 34 ft-lb. In another test a more stable steel containing 17.42 chrome, 8.24 nickel, and 0.06 carbon exhibited, after cold rolling, a maximum strength of 138,000 lb. per sq. in., a yield point of 128,300 lb. per sq. in. an elongation in 2 in. of 29 per cent and a reduction in area of 68

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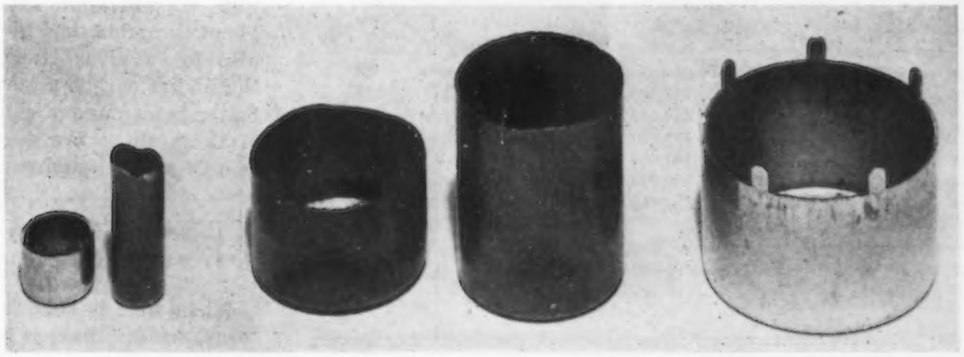
FIG. 7—Three deep drawn cups which demonstrate the favorable characteristics imparted to steel by a continuous heat treating furnace. The use of this type of furnace has greatly facilitated the making of this type of product.



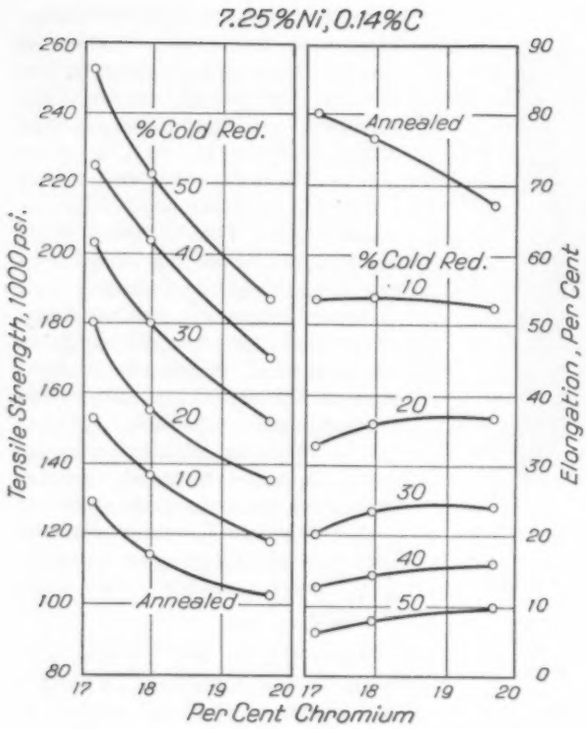


FIG. 8 — Influence of chromium in alloys containing about 0.14 per cent carbon and 7.25 per cent nickel upon the tensile strength and elongation, after various amounts of cold work.

per cent with an Izod impact value of 67 ft-lb. While these results may not be entirely comparable to those obtained in cold-rolled strip, according to Mr. Franks they do show that after cold working to approximately the same degree the higher strength steel is inferior in toughness to the more stable steel with a somewhat lower strength.

Mr. Franks also commented on the usefulness of the Krivobok data dealing with fatigue data for high strength 18 and 8 steels. These data may find considerable use in determining the best composition and to what extion should be increased by cold rolling to obtain optimum service. Mr. Franks further pointed out that additional research was needed to determine the low temperature characteristics of cold-rolled strip of the steels investigated by Krivobok.

Another comment on the Krivobok paper was presented by Paul Ffield, of the Bethlehem Shipbuilding Corp. In his experiences in fabricating experimental structures of high-tensile 18 and 8, Mr. Ffield found that there was considerable variation in properties occurring from sheet to sheet of the material. There still appears to be some factor, other than those pointed out by Krivobok, outside the analysis in either the heat treatment or rolling of the material which will produce variations in tensile properties from the same heat of steel. Mr. Ffield was of the opinion that Krivobok and his associates should attempt to investigate this particular phase of the problem further.

Mr. Ffield commented on the proof stress results as follows: There is a method of raising the proof stress other than by cold rolling which should not be overlooked when studying the structural applications of austenitic alloys. The method is to preload the material above the yield point thereby raising its yield strength to a new level. It so happens that the duraluminum girders and steel tie rods in the airship Hindenburg have in some cases been so treated. This is accomplished by either stretching the sheet after rolling, or, as in the case of the Hindenburg, stretching the girder beams after fabrication. This latter method has the advantage of reorientating the locked up shop fabrication stresses.

Another valuable discussion of the Krivobok paper was presented by T. F. Olt and R. S. Burns, of the American Rolling Mill Co. These two men commented as follows: considering high-tensile stainless of, say, 150,000 lb. per sq. in. which no doubt enjoys the widest usage at the present time, the authors in the data presented point out that a cold reduction (final) of from 8 to 45 per cent (roughly), depending on the carbon-chrome-nickel relationship, is required. That such a tensile strength can be produced without any final cold reduction whatever (or in the "dead soft annealed" condition) by further variations in composition is shown in Table II.

The materials shown in Table 11 had been hot rolled to 0.100 in., annealed at 2100 deg. F. for 5 min. plus air cool, pickled, and cold reduced to 0.055 in. and reannealed at 2100 deg. F. for 5 min., pickled, and cold reduced to 0.031 in. and again reannealed to 2100 deg. F. for 5 min. before pickling and testing. It will be noted that for a given chromium and nickel content, also for a given tensile strength, the higher carbon material has the better percentage of elongation. All of these alloys are quite resistant to a 20 per cent salt spray.

TABLE II

Effect of Composition on Physical Properties of Chrome-Nickel Alloys

(Showing that final cold rolling is not necessary to produce a high tensile strength)

Composition of Alloy			Strength in Lb. per Sq. In.		Elongation Per Cent	Rockwell "B"	YS
C	Cr	Ni	Yield*	Tensile	in 2 In.	Hardness	TS
0.06	17.5	6.2	30,300	153,000	22.9	90	0.195
0.07	15.8	7.2	31,300	149,500	21.5	90	0.209
0.06	16.6	6.3	37,700	170,100	13.5	24	0.222
0.06	15.8	6.4	47,900	181,000	9.0	32	0.265
0.12	16.9	6.0	41,400	157,700	32.1	95	0.261
0.12	15.6	6.1	46,400	187,600	17.0	28	0.246

*Yield strength at 0.5 per cent elongation under load, rate of strain 0.05 in. per min. to yield strength, 0.2 in. per min. to break (head speed of testing machine ½ in. per min. from yield strength to break).

Dimension Changes of Tool Steels

When steel is heat treated there occur, besides changes in the struc-

ture, also changes in the volume and dimensions of the piece. The change in volume during heat treatment, which is caused by structural changes, has been studied by numerous investigators and is comparatively easy to determine by investigating the change in the specific gravity. It is, however, not possible to calculate or to reach any definite conclusions in regard to the dimensional changes from the change in volume during heat treatment because the changes in dimensions are not equal in each direction.

Changes in dimension during heat treatment are dependent upon numerous factors other than the structural changes, as for example: the shape of the object, conditions during heating and cooling, etc.

The change in dimension during heat treatment has not been very thoroughly studied in spite of its great practical importance. And it was the purpose of a voluminous research by Einar Ameen, of Uddeholms A/B, Sweden, to supplement previous studies with data relative to dimensional changes occurring during quenching and tempering of ordinary grades and shapes of tool steels. Mr. Ameen's investigation was limited to include only the changes in dimension occurring when the steel is being heated and cooled properly and, therefore, does not include the pronounced dimension changes, such as warpage, which might occur as a result of improper heating and cooling.

The following types of steel were selected for study by Mr. Ameen:

No. 1—Very pure unalloyed carbon steel (1.00 C, 0.23 Si, 0.25 Mn, 0.015 P and 0.013 S) with wide hardening range, relatively shallow depth of hardness penetration, and water hardening.

No. 2—Steel of the same analysis as No. 1, with not as wide a hardening range and greater depth of hardness penetration, water hardening.

No. 3—Tungsten steel suitable for twist drills and similar tools, water hardening (1.15 C, 0.20 Si, 0.21 Mn, 0.013 S and 0.92 W).

No. 4 — Chrome-tungsten-vanadium oil hardening, so-called "non-deforming" steel (0.90 C, 0.32 Si, 1.15 Mn, 0.024 P, 0.012 S, 0.56 Cr, 0.64 W and 0.11 V).

No. 5—High-carbon high-chromium air hardening "non-deforming" steel with molybdenum and vanadium additions (1.64 C, 0.28 Si, 0.36 Mn, 0.016 P, 0.006 S, 12.40 Cr, 0.13 Ni, 0.94 Mo and 0.17 V).

In order to investigate the deformation occurring when only heat stresses

A VOLUMINOUS report on the characteristics of chrome-nickel steels of high tensile strength resulting from cold working was presented by V. N. Krivobok. For years Mr. Krivobok was professor of metallurgy at the Carnegie Institute of Technology and latterly has been associated with Allegheny Steel Co. as associate director of research.

are present, the following sample was also included in the test:

No. 6—Very soft pure iron manufactured by the Flodin process.

A very large and detailed examination of the dimension changes in

A SEARCHING study into the dimension changes of tool steels during quenching and tempering was presented by Mr. Ameen, assistant chief metallurgist of Uddeholms A/B, Uddeholm, Sweden.

these six alloys was presented in Mr. Ameen's paper entitled "Dimension Changes of Tool Steels During Quenching and Tempering." Some of the results obtained are summarized in the following paragraphs:

The deformation which occurs during the heat treatment of steel is caused by heat stresses and also by stresses which occur in connection with the structure transformation.

The heat stresses seek to deform the hardened object so as to give it a shape approaching a sphere. The transformation stresses tend to deform the sample in the opposite direction. Which of the stresses that are to determine the character of the deformation depends upon the composition of the steel, shape and size of sample, quenching temperature, etc. It is, therefore, difficult to determine beforehand how an object is going to be deformed during heat treating.

Factors which increase the temperature variations during heat treatment, such as rapid velocity of cooling and decreased heat conductivity, increase the deformation on account of heat stresses. Factors which increase the elastic limit of the material at elevated temperatures reduce the deformation on account of heat stresses. Transformation stresses decrease in case part of the structure is a constituent which does not participate in the transformation, for example, retained austenite or excess carbide.

With samples that harden all the way through, steel No. 5 has given approximately four times less deformation, and steel No. 4 about two times less deformation than steels No. 1, 2 and 3, which latter are about equal. With larger samples, where the steels Nos. 1, 2 and 3 do not harden through, the condition is different. Under this condition, steel No. 3 has given as good a result as steel No. 5, and steels No. 1 and 2 are only slightly inferior. Steel No. 4 has, however, given considerably larger deformation than the other steels. In the steels Nos. 1, 2 and 3, which have not hardened through, the deformation is decreased with reduced hardness penetration.

The steels considered as non-deforming, of the type of steel No. 4, are usually, from the point of view of deformation only to be pre-

(CONCLUDED ON PAGE 40)

ABSTRACTS of A.I.M.E. PAPERS

Dr. Sauveur Traces Metallurgical History and Names 22 Leading Metallurgists. Blast Furnace and Steel Melting Problems Emphasized.

OUTSTANDING in the series of interesting discussions at the fall meeting of the Institute of Metals and Iron and Steel Divisions of the American Institute of Mining & Metallurgical Engineers at Cleveland last week, was an unusually interesting talk by Dr. Albert Sauveur, "dean of American metallurgists," who took for his subject "Metallurgical Reminiscences."

Before a large audience attending the annual banquet, Dr. Sauveur traced the history of metallurgy in this country, and completed his subject by flashing on the screen pictures of 22 of the outstanding men in the metallurgical field. As each picture was presented, Dr. Sauveur, emulating the practice of conferring degrees, cited each of these men for their outstanding and useful work in furthering the cause of metallurgy.

Dr. Sauveur traced the growth of metallography, starting in May, 1888, when Dr. Sorby in England presented his results of the microscopic examination of iron and steel. At the suggestion of an Illinois Steel Co. executive at South Chicago in 1891, Dr. Sauveur took up the subject of metallography, which marked the introduction of the microscope for the first time in American steel mills. Osmond in France and Martens in Germany preceded the introduction of this phase in the United States.

At this point, Dr. Sauveur projected on the screen three photomicrographs of a metal, the first ever prepared in this country. According to Dr. Sauveur, other early workers were J. O. Arnold, Roberts-Austen, J. E. Stead and Sir Robert Hatfield in England; Henry Marion Howe in the United States and Harry Le Chatelier in France. Research was interrupted in 1896 because of the discovery of X-rays and the attempt of American scientists to apply this discovery to the examination of defects in steel. Dr. Sauveur stated that the closing of the laboratory of the steel mill in which he was conducting

researches, owing to the appointment of a president unsympathetic with this type of work, retarded progress somewhat.

Some difficulty was encountered at this period in interesting others in metallurgy. It was in 1897 that Dr. Sauveur published his book on metallography and in 1899 he became associated with the Harvard faculty, since which time no one versed in metallurgical subjects needs to be told of the contributions he has made and the hundreds of metallurgists he has trained and "fired" with enthusiasm. Continuing his reminiscences, Dr. Sauveur completed his talk by awarding citations to those whom he felt should be recognized for their untiring efforts in making the study of metallurgical problems what it is today.

Dr. Sauveur Confers Degrees

Henry Clifton Sorby, a great mineralogist and petrographer, who through his happy thought of examining meteorites under the microscope as he had examined minerals and rock, and in extending that examination to alloys of iron and carbon, and through his masterful interpretation of what he saw, created the science of metallography.

Dimitri Tschernoff, famous Russian metallurgist, who with crude appliances and at a time when metallurgy was emerging from the dark ages, but with a clear mind, studied dendritic structure of castings and of the ratios and hardening of these by rapid cooling.

Floris Osmond, to the bearer of the science of metallography, a prince in the field in which he labored. Through his discoveries concerning new carbon alloys, he established the allotrophy of the element iron. His early description of the microscopial constituents of these have remained classical.

Adolph Martens, a German engineer who was one of the first to apply the microscope to the study of steel.

Sir Robert Hadfield, an English industrialist and metallurgist, who gave us authentic manganese steel and also silicon steel. A prolific writer on metallurgical subjects, and a generous contributor to metallurgical research.

Henry Marion Howe, a great teacher and metallurgist; a masterful coordinater, endowed with the gift of bringing order out of chaos and light out of darkness.

DR. ALBERT SAUVEUR, "dean of American metallurgists," in his paper "Metallurgical Reminiscences," traced the growth of metallurgy in this country and named 22 outstanding world metallurgists.

o o o

John E. Stead, chemist and metallurgist, who explained the behavior of phosphorous in steel and iron, and also a certain brittleness in mild steel, known as Stead's brittleness.

Roberts-Austen, English teacher, chemist and metallurgist, who explained to us the constituents of alloys, and took an active part in the development of the iron-carbon diagram.

J. O. Arnold, an Irish professor and metallurgist with an Irish temper, who conceived the existence of carbide of iron, $Fe_{21}C$. A pioneer in the use of vanadium and steel.

George Charpy, a practical metallurgist who, when operating important steel works, explained to us the cause of directional properties following hot work. A pioneer in impact testing of metals who gave us an early application of the three dimensional diagrams. His study of bearing alloys opened the way to fruitful research in that direction.

Benedict, a distinguished Swedish metallurgist, to whom we are indebted for many important contributions on various aspects of metallography and for the part he took in the development of iron carbon equilibrium diagram.

K. Honda, president of a Japanese University, which maintains a world-famous metallographic laboratory, manned by a large number of competent workers. He has contributed much to the advance of metallography.

Sir Harold Carpenter, an English metallurgist, descendant of Henry Cort, the inventor of dry-puddling process and the two-high rolling mill. Distinguished alike by clarity of thought, skill and experimentation, and soundness and argumentation.

Rosenhain, a brilliant English metallurgist and physicist. An independent thinker, bold in his attacks on theories. He disclosed to us the mechanism of plastic deformation of metals and took an important part in the development of the iron carbon equilibrium diagram.

Colonel N. Belaiew, a Russian disciple of Tschernoff, who has brilliantly carried forward the work of his master and who treats metallography as a fine art.

Leon Guillet, French metallurgist of great renown. A prolific writer who has contributed much to our knowledge of alloy steels.

Albert Portevin, a French metallurgist capable of exquisite thinking on metallurgical subjects. His artistry has penetrated into many dark corners where it has shed a pleasant light.

Maunsel White, an American metallurgist who, with Taylor, discovered high speed steel, or if you prefer the heat treatment conferring high speed characteristics to steel of suitable composition. Enough of an accomplishment for any man.

Brinell, a Swedish engineer and metallurgist who made us conscious of the importance of measuring the hardness of steel and who gave us the method that bears his name. He also advanced our knowledge of the occurrence of blow holes in steel and of the influence of manganese and of silicon in preventing them.

Harry Brearley, an English metallurgist, universally beloved because of his great contribution to the world in presenting it with

stainless steel, and because of his modesty.

H. H. Campbell, an American metallurgist, the author of a book that marked a great advance in the manufacture of open hearth steel and added much to our knowledge of the physical properties of steel.

Henry Le Chatelier, a great teacher, chemist and metallurgist, representative of the French Savant at his best. Designer of a pyrometer which revolutionized the art of heat treatment and made possible the discovery of the upper critical points. He also gave us the modern metallurgical microscope.

Dr. Sauveur voiced his personal appreciation for Prof. H. M. Boylston of the Case School of Applied Science, who was his partner in the early phases of metallurgical developments.

Another eminent speaker at the banquet was W. R. Barclay, president, British Institute of Metals, who, in a sincere and straightforward manner, expressed the desirability for scientific and technical men to break down barriers between nations and work in harmony, thus giving a concrete example of the benefits of international cooperation to politicians. He conveyed to the members hearty greetings from their fellow workers in England.

While 350 members of the two divisions of the A.I.M.E. had been expected at the fall meeting, fully 450 registered during the three days and several interesting papers were presented, salient points of some of which follow.

FALL dinner meeting of the Institute of Metals and the Iron and Steel Divisions a speaker. Another prominent guest was W. R. Barclay, president, British Institut liberally and thus build a greate

Flue Dust Recovery

It is possible to collect about 40 tons of wet dust a day from a 1000 ton blast furnace, which at a nominal value of only $2 a ton would mean asaving of nearly $30,000 a year and would give the furnace 14,000 tons of very cheap ore. This is one good reason why flue dust recovery is now becoming standard practice, another reason being that legislation is cropping up in various sections of the country limiting lake and stream pollution from this source.

T. B. Counselman, the Door Co., Inc., Chicago, reviewed the development of flue dust collectors, particularly in connection with thickeners. Slides were shown of an improved balanced tray thickener in which there are a number of compartments. An installation at the Ford Motor Co. has a six-compartment thickener, the outside diameter of which is approximately that of a stove. The sludge settles out and is raked to the center of each compartment and discharged into a boot, which is delivered below the sludge level in the next lower compartment. The entire mechanism is suspended on a ball bearing 6 ft. in diameter, which tends to eliminate any side sway of the mechanism. An equivalent single compartment flue dust thickener would have to be 80 ft. in diameter in place of the one described, which is 22½ ft. in diameter, service a 750-ton blast furnace.

The latest development in thickeners is the Torq machine, a pair of which were put into operation at the Corrigan, McKinney plant of the Republic Steel Corp. in Cleveland last week. Slides were shown of a similar type thickener developed for de-silting Colorado River water for irrigation purposes. The thickener mechanism is carried on a central pier with two radial arms driven from the center. The Torq feature consists of hinging the arms in such a way that in case of a large sand overload the arms swing backward and upward, riding over the settled solid without increasing the motor load.

M. F. Morgan of the Corrigan, McKinney plant described some of the features of the two 70-ft. Torq tanks recently installed in Cleveland. They are 70 ft. in diameter and are built entirely above the ground, so that the tunnel discharge and sludge pipes are readily accessible. The central sludge pipe is 8 in. in diameter but is reduced to 2½ in. at the sludge pump, which delivers its material to a 6-disk American filter located in the sintering plant proper. Cake from the filter is delivered by belt to the pug mill where it is mixed with ore before being sintered. Cake has about 30 per cent moisture. The plant is designed to turn out about 100 to 125 tons of

the A.I.M.E. held at the Statler Hotel, Oct. 21. Dr. Albert Sauveur was the principal of Metals, who urged that the world's technical men should exchange information more science on a cooperative basis.

sintered material in 24 hrs. on a 400-ton blast furnace.

Refractories for Blast Furnaces

The ideal firebrick for blast furnaces must be free of all elements that possess catalytic properties that lead to deposition of carbon within the structure of the brick itself, which create internal strains that ultimately cause the brick to shatter.

Disintegration tests on blast furnace brick carried on over a period of several years has led Roy A. Lindgren of the blast furnace department of Wisconsin Steel Works to the conclusion that the presence of Fe_2O_3 acts as a catalyzer in the presence of carbon monoxide and results in the deposition of carbon which is primarily responsible for brick failure.

The process of disintegration begins with the blowing in of a furnace. After a year's run a disintegrated area about 1 ft. thick usually develops about 1 ft. back from the lining wall which has assumed a vitrified hard wearing surface, monolithic in appearance. Eventually this hard surface lining works back to the point where the disintegrated brick was found at the end of the first year's service and at this point the blast furnace must be shut down.

Non-porous bricks that resist the infusion of CO gas naturally tend to stand up better in service. Refractory manufacturers in attempting to eliminate porosity in bricks produced the de-aired and the vacuum pressed brick. In producing a brick with all included air removed they made one with homogeneous internal structure with a uniform hardness throughout.

Disintegration tests made by Mr. Lindgren were carried out in the presence of ordinary blast furnace gas. Dr. J. P. Unger of Pittsburgh described some accelerated disintegration tests in which 80 to 90 per cent CO was present in the gas. He questioned why blast furnace firebrick should disintegrate in the presence of CO when brick in cupolas, stoves and gas producers which were also subjected to CO did not so disintegrate. Another anomaly is the fact that chrome bricks containing up to 20 per cent iron do not tend to disintegrate.

It is Dr. Unger's contention that it depends upon the form in which the iron exists as well as its chemical composition. Iron oxides, for example, will cause disintegration but not ferrous silicates. If finely divided ore is deliberately mixed in with the clay, only fine cracks will develop when the brick is subjected to CO gases, but if larger particles of ore are mixed in the clay like raisins in a cake, complete disintegration will invariably occur. His suggestion to brick manufacturers is to burn the brick in a reducing atmosphere to convert any iron oxides to the magnetic form and then give the furnace all it could take to convert the oxide into a silicate. A hard burn such as this invariably results in a brick that resists disintegration, whereas a soft burned brick usually fails.

Blast Furnace Operation in the South

Use of the most modern equipment in labor saving devices is the only means by which blast furnaces in the Birmingham district can hope to compete with Northern made iron, according to J. M. Hassler of the Thomas plant of the Republic Steel Corp. Labor costs have risen tremendously since the inauguration of the New Deal and the average weekly wages in the Birmingham district today are $21.21 as against $21.24 in the Pittsburgh area. The labor differential has, therefore, disappeared, but through the use of modern practice the labor cost per ton has been brought back to the 1916 level. The average worker receives 145 per cent more pay, but there are 55 per cent less people on the payroll.

One way Republic has gone about reducing blast furnace costs has been to install a sintering plant at the Thomas works in June, 1936, the only one of its kind in the South. There is an excess of carbon in the flue dust and it is necessary to dilute it with fresh ore, which in this district is highly siliceous in character, ranging from 11 to 23 per cent silicon. A charge in the sintering plant consists of 40 per cent flue dust, 10 per cent

sludge and 50 per cent A and B ores mixed.

To improve the practice, the ore has been broken down in crushers to minus ¼ in. before it is mixed with the flue dust for sintering. The blast furnaces themselves have been rather completely redesigned by the Arthur G. McKee Co., Cleveland, the top of the furnace being widened considerably to reduce flue dust losses. Output has been increased 100 tons or more per day with much less flue dust and less coke.

Southern pig iron a few years back was a very poor grade. Structure was non-uniform and full of hard spots and it was not infrequent to have a pig shatter into eight or ten pieces when it was thrown on a pile. Through the use of triple skim pig making machines, which first discharge into a ladle, uniformity has been considerably improved.

Using the old pig beds and large sized pigs, it was not uncommon to find the silicon varied by as much as 1 per cent from the same heat. This was brought out in the discussion by J. T. MacKenzie of the American Cast Iron Pipe Co., who paid tribute to the small pig as being a wonderful help in small cupola practice. Mr. MacKenzie pointed out, incidentally, that 40-lb. pigs had been produced by the Tennessee Coal & Iron Co. as far back as 1919, although Frank Thatcher of the Interlake Iron Co. indicated that the merchant furnaces in the South were not yet producing a small enough pig. The chief trouble at present is the non-uniformity of pig size. A large pig weighing 125 lb. for example, when mixed with smaller ones of 75 lb. average weight, will quickly sink to the bottom of the cupola and hit the tuyere blast where it is oxidized and burned before it can be melted.

Questions were raised from the floor as to what effect the grain structure of the pig had on the ultimate casting, since the metal was completely reduced to liquid form in the cupola. No one seemed to be able to give the right answer, except to say that the structure seemed to persist in the final casting.

C. L. Bransford also of the Republic organization, Birmingham, commented on some of the problems of handling the types of ore encountered in that district. As ore beds are worked further south, the seams widen to 20 ft. instead of 7 ft., which enables the company to produce 20,000 tons of ore a month at a mine cost of 70 to 80 cents a ton, but beneficiating and sintering costs are very large.

The leaner ores have yet to be used. They contain about 36 per cent iron and 30 per cent insoluble material. A proposed method of handling these ores is to grind them finely and float off the insolubles, leaving about 10 to 12 per cent insolubles and 50 per cent iron. In commenting on the labor situation down there, Mr. Bransford also noted that although hourly rates are comparable with those in the North, it is not possible to get the same amount of work out of southern laborers owing to the debilitating effect of the weather during the summer.

Metallurgists Then as Today Had Disappointments

September 2, 1896

Mr. Albert Sauveur,
Spencer, Mass.,

Dear Sir:

After conversation with our people in the mill I find that there is no vacancy of any description we can offer you at present.

Yours respectfully,

(Signed) C. M. Schwab,
General Superintendent

Ingot Mold Life

Manganese has a very decided effect on the life of ingot molds, according to W. J. Reagan of the Edgewater Steel Co. As a result of tests made at that plant, he found that the best analysis of the mold material was one containing from 1.35 to 1.65 per cent manganese and from 1.50 to 1.75 per cent silicon. Tests on a group of molds showed that by raising the manganese from approximately 1 per cent to 1.20 per cent, an increase in average life from 120 to 178 heats was given. The effect of silicon was not nearly so marked but indicated that either too much or too little silicon was detrimental to mold life.

Another factor of prime importance is the ratio of the ingot weight to the mold weight. The chart (opposite page) indicates the variation in mold life according to the mold weight for the 13-in. fluted ingot of 3000 lb. net weight. It is quite obvious that when the mold weight is reduced the mold life is reduced materially.

E. J. Kauffman of the Valley Mould & Iron Corp., Hubbard, Ohio, in discussing this paper, pointed out the importance of holding constant the many variables involved in order to investigate the effect of one element. These variables includes the mold metal itself which may be direct, cupola or openhearth; its chemical composition and the physical nature of the iron, which is largely related to its casting temperature; the workmanship of the mold, including its own sand molding and annealing after casting; the many service factors involved including the type of steel to be transformed into an ingot; the method of pouring whether top or bottom; the coatings or sprays used on the inside and the temperature of the mold at the time the ingot is poured. Mr. Kauffman concurred in the conclusions of Mr. Reagan for the particular conditions outlined.

Other speakers indicated that practice of their mills did not check with the conclusion of Mr. Reagan, largely because of the difference in the other variables mentioned. It was generally concluded, however, that the direct metal molds are superior to those cast in a cupola and that silicon over 1.60 per cent tends to shorten the life of a mold.

There was not complete agreement as to what causes failure of a mold. Mr. Reagan attributed the cracking on the flats to a concentration of heat at the point of failure causing the metal to grow or increase in size until small pieces become dislodged. Careful measurements of the interior of the mold have shown that the interior diameter gradually decreases by as much as ⅜ in. before the mold is

pulled out of service. This internal growth contributed to the failure. Mr. Kauffman on the other hand thought that the swirling action of the metal a few inches above the mold radius created an errosion effect that contributes to mold failure at this point.

Speeding Up Steel Refining

A program designed to discover some of the basic facts concerning the properties and behavior of fast metal-slag dispersions is being undertaken by the Metallurgical Division of the Bureau of Mines, according to B. A. Rogers, senior metallurgist of that division. This program proposes to investigate four systems of mixtures or dispersions as follows:

1. Liquid steel and liquid slag
2. Solid steel and liquid slag
3. Solid steel and solid slag
4. Gases in liquid steel and liquid slag.

Mr. Rogers reviewed experiments made along this line since the days of Sir Henry Bessemer's early experiments in the refining of metal. He saw great promise in the Perrin experiments which have been carried on abroad. By this method steel is poured at a rate of about 15 tons per min. into a ladle containing slag composed of a mixture of 60 to 65 per cent calcium oxide, 3 to 10 per cent silica, with the remainder iron oxide plus enough fluorspar to give the desired fluidity. Steel used had been blown in the basic Bessemer furnace and was high in phosphorus. In less than a minute this phosphorus had been reduced by as much as 90 per cent. Perrin estimates that a given volume of steel is in contact with the slag for not over 10 seconds.

Vital factors in this process are a division of the slag into fine particles and entrainment of the slag by the metal and subsequent rising of small globules of slag out of the metal. Intense turbulence is necessary in order that the metal and slag form an emulsion if rapid elimination of an element such as phosphorus is to be attained. Deoxidation of steel can be accomplished by the same method.

For the benefit of open-hearth operators present, Mr. R. S. Dean of the Bureau of Mines drew an analogy between the sulphonation of oils in the petroleum industry and the purification of steel. If two immiscible liquids such as sulphuric acid and castor oil are to be mixed, one wouldn't spread out the acid in a large flat pan with a layer of castor oil on the top, then hold a candle over it, hoping that something might happen. In the oil industry, sulphonation is accomplished in a very few seconds by extreme mechanical turbulence. Comparison between the twelve hours required in an open-hearth furnace and the few minutes required in the Perrin process was obvious.

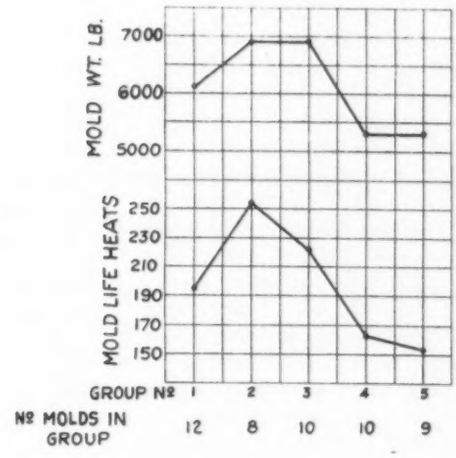
Mr. Rogers thinks it probable that a method could be developed by which pig iron could be reduced to steel quickly by the simple device of alternately dispersing and floculating the molten metal in a succession of slags. Ultimately of course, the question will be settled on an economic basis.

An interesting paper by M. Gensamer, assistant professor of metallurgy, and B. Lustman, graduate student of metallurgy, Carnegie Institute of Technology, Pittsburgh, on preferred orientations produced by recrystallizing cold-rolled low carbon sheet steel, was presented, in which the authors had as their objectives: to study the general behavior of cold-rolled mild steel on recrystallization below the critical temperature A_1, and to attempt experimentally a demonstration of the genesis, suggested in other studies, for the surface texture in cold-rolled steel. The authors reviewed previous investigations in which it was found that the surface of cold-rolled low carbon steel auto body sheets exhibited a deformation texture significantly different from the texture possessed by the inside of the sheet. Efforts to produce a surface texture by buffing a sample exhibiting the normal or inside texture, using a copper lap, have not been successful. According to the authors, other workers on the subject have suggested that the surface texture might be the result of partial recrystallization of the normal or inside texture.

The authors described their method of experimentation, accompanied by slides, and from the data presented they drew four pertinent conclusions which they felt were justified: (1) Cold-rolled mild steel exhibiting a well-developed deformation texture, recrystallizes with the formation of a recrystallization texture. (2) At no temperature of recrystallization below the critical is there produced a random orientation of the crystallites (725 deg. C. was the highest used in this work, but 845 deg. C. was used by Kurdjumow and Sachs). (3) Glocker's relationship between the deformation and recrystallization textures has again been substantiated but no rationalization of the process is offered. (4) The pole figure for partly recrystallized cold-rolled mild steel originally exhibiting a normal texture, agrees well enough with the pole figure for the surface of cold-rolled samples to lend support to the hypothesis that the surface texture may be produced by partial recrystallization of the texture characteristic of the inside of the sheet.

Preferred Orientation in Hot-Rolled Low Carbon Steel

According to Gensamer and P. A. Vukmanic, graduate student in metallurgy, it has only been recently



EFFECT of weight of a 13-in. fluted ingot mold on mold life.

realized that preferred orientations are common in hot-rolled steels. They pointed out that N. P. Goss stated that hot-rolled mild steel exhibits a texture different from the characteristics of cold-rolled steel. No complete study of these hot-rolling textures has been reported, using the pole figure method of Weaver.

In their experiment the authors used auto body sheet bar ¼ in. thick, which was hot-rolled at two temperatures, 780 deg. C. and 910 deg. C., the temperatures referring to the temperatures of a furnace in which the steel was heated. After each pass the steel was returned to the furnace and held there long enough to return to temperature. In order to determine the effect of any preferred orientation that might have persisted through the normalizing treatment, one specimen at each temperature was rolled in the same direction as the original working direction and the other at right angles to it.

The authors, from their study, drew the following conclusions: mild steel rolled at 780 deg. C. exhibits well-developed preferred orientations; when rolled at 910 deg. C. a much less well-developed texture results, and the texture developed at 780 deg. C. closely resembles the texture developed by cold-rolling.

Impact Testing and Bend Testing

A round table discussion of physical tests and their significance furnished plenty of thought for those in attendance. Leading off with a paper on the transverse notch bar test by S. L. Hoyt, mention was made of recent studies on tension impact tests by H. C. Mann. Dr. Hoyt, in his talk, dispensed with discussing mechanical data on the notch bar test and confined his attention to bringing up those factors surrounding this type of testing which are often in question.

It was his contention that three major questions must be answered. The first relates to disagreement among results of check tests from the same part, though the tensile properties agree. The second question relates to variations from heat to heat, though the tensile test results agree, and the third inquiry relates to poor impact values, though the tensile results indicate no impairment in quality. Dr. Hoyt said that one frequently hears that results are unreliable, by which is meant that, due to imperfections in the testing procedure, sometimes high results and sometimes low results will be secured from identical samples. The chance causes of the spread are assigned to the test procedure and not to the material itself. According to him Charpy appreciated the situation which was created by experience such as this and with Cornu-Thenard made a special study of uniformity of test results from a block of steel which they had reason to believe was chemically and physically homogeneous. They report impact figures which agree among themselves as close as 1 to 2 per cent and which scarcely ever disagree by as much as 4 per cent. It is Dr. Hoyt's contention that this agreement is as close as can be claimed for tensile properties and is so good that one can no longer raise serious objection on the score that the tests cannot give good check results. He was positive that real variations in tests could no longer by ascribed to vagaries of the test and it was his thought that the point is seldom raised any more. According to him, the logical explanation of variations in duplicate samples is that the greater sensitivity of the notched bar test to factors which are lost over by the tensile test, or missed entirely, bring out differences which are very real.

On the other hand, many steels show sudden and marked change of behavior with changes in test temperature, velocity of impact, and in width of bar for a given notch. He further added that aside from a natural spread in results, it is possible to get variations which are due to segregations, laminations, coarse foreign inclusions, etc., and he felt that in technical practice it would be highly desirable to differentiate between chance and controllable causes of these variations which could be done by suitable analytical methods.

Having answered the first question, Dr. Hoyt contended that not much could be said about variations from heat to heat of steel, inasmuch as the notched bar test is sensitive to manufacturing conditions and they are vividly brought to light by this test.

In commenting on the third question, he stated that there is no doubt that the tensile test completely misses serious cases of brittleness which are clearly and unequivocally shown by the notch bar test. The tensile test is a static test and therefore does not bring out brittleness or lower ductility which may develop when the material is rapidly strained.

An interesting sidelight in the discussion was brought up concerning test pieces which do not break, but the ends are marked where the hammer or support is dragged over the test. It was the consensus of opinion that the qualitative value should be recorded in tests of this type in addition to a notation as to what happened to the test piece.

In commenting on the tension impact test paper which was not presented, it was brought out that different steels recorded the same energy rate until a certain velocity is reached, which condition brings out the differences inherent in the steels. Considerable discussion of the tension impact test followed and it was the opinion of some present that this type of testing was more satisfactory than the notch bar test. From remarks made, it was indicated that there is still plenty of room for more comprehensive studies on both types of tests.

In a general discussion of bend tests by J. R. Townsend several slides were presented showing the different simple mechanisms involved in bend testing. Some of the set-ups are in reality a duplicate of the final operation which the steel must be put to, and during a discussion on bend testing as applied to welds by Wilbur B. Miller, it could be easily seen that the majority of those present felt that the bend test was a simple, inexpensive procedure which correlated closely with tensile strength test, but, of course, not to a too great a degree of accuracy. About the most important factor covered was the question of the ratio between width and thickness of test pieces. It was pointed out that specifications of various associations involve five different ratios running from 1½ to 1 up to 5 to 1. There was one question in which there was unanimous approval, namely, that those on committees responsible for standardization of the ratio between width and thickness on band tests should get together and agree on one figure. There seemed to be general agreement that a 3 to 1 ratio would be satisfactory and do much toward standardizing bend testing.

WELDING MEETING PAPERS

Fundamental Factors of Welding Design Discussed — Weldability of Different Metals Studied — Paper Describes Welded Machine Construction

IN comprehensiveness and quality of technical contributions, and in attendance, the 17th annual meeting of the American Welding Society, and the welding sessions arranged by the American Society of Mechanical Engineers, held during the Metal Congress, at Cleveland last week, definitely equalled or surpassed previous Metal Congress welding forums.

Of the 10 sessions, six were under the auspices of the A.W.S., two under the auspices of the A.S.M.E., and two were held jointly. The more than 35 technical papers and addresses covered all types of welding and allied processes and important design, metallurgical and application practices. The papers of two sessions were devoted entirely to reports of fundamental research, a basic activity of the welding society. Chairmen and vice-chairmen of the various sessions included recognized authorities in their respective fields.

In addition to the meetings, displays and demonstrations of a wide variety of welding and cutting apparatus and supplies, including a number of new developments, were to be seen at the National Metal Exposition held concurrently at the Public Auditorium. Also, a number of Cleveland manufacturing plants employing weld fabrication were open to visitors.

Sessions were held at the Hotel Cleveland, Oct. 19-23. At its annual business meeting, the A.W.S. elected new officers and awarded the Samuel Wylie Miller Memorial Medal as reported elsewhere in this issue. Technical papers were for the most part preprinted; brief abstracts of some of them are given below.

Fundamental factors governing satisfactory welded design were discussed in an outstanding paper by C. H. Jennings, Westinghouse Research Laboratories, at the session held under the joint auspices of the A.W.S. and the A.S.M.E.

It is important, he said, that designers be thoroughly familiar with methods of calculating weld stresses, allowable working stresses, physical characteristics of parent and weld metals, fabrication problems, and inspection and testing facilities.

An interesting comparative analysis of butt and fillet welds provided data to assist the designer in the selection of the proper type. Formulas were given for calculating weld stresses in different types of joints. Working stresses and safety factors for butt and fillet welds are determined on the basis

of static and dynamic tests. Also of value to the designer is a table of recommended working stresses for bare and coated-electrode welds subjected to all types of loading, the table being based upon joints made on ordinary low-carbon steel. An appendix to the paper contains a number of typical welded-joint designs with the corresponding recommended formulas for calculating the stresses.

Weldability of Alloy Steels

An address on "Alloy Steels and Their Weldability," by Dr. A. B. Kinzel, chief metallurgist, Union Carbide & Carbon Research Laboratories, Inc., was another feature of this session. Dr. Kinzel divided his discussion into three main headings, namely, low-alloy steels for general structural purposes; heat treated automotive type steels for machinery and general engineering; and the high alloy steels such as stainless, for use in the chemical and other industries.

The modern low-alloy, high-strength steels were said to differ from their predecessors in that they may be welded without seriously affecting the metal next to the weld—this result is achieved through use of chromium, manganese or some combination of these elements with silicon, vanadium, molybdenum, phosporous or copper, with carbon at a low level. From the fabricating standpoint it matters little which combination is used, he said, providing that the alloy content is well balanced and the physical properties attained with carbon at 0.14 per cent or less in the 75,000 lb. per sq. in. grade and 0.22 per cent or less in the 90,000 lb. grade.

Most of the low-alloy steel brands on the market today are made in both carbon ranges, he continued, and follow this basic principle: the lower the carbon for a given strength, the higher the ductility and the lower the susceptibility to hardening under the heat-treating conditions imposed by various types of welding.

The effect of welding heat on metal adjacent to the weld proper and the intensity of internal stresses to be expected with joints of various design and various welding practices were outlined.

S.A.E. and Special Steels

Heat treated S.A.E. steels may be joined by welding but in all cases subsequent heat treatment is necessary to assure optimum physical properties. The welding rod may be of the same analysis as the parent steel, but it is usual to use rods designed for optimum flowing properties combined with satisfactory response to heat treatment.

Welding of special steels in which corrosion and oxidation resistance rather than physical properties are the prime characteristics was emphasized as presenting a special case. Welding of austenitic stainless steel of the 18-8 type is another special case having wide ramifications. A solution of the precipitation problem was said to have been found in the addition of columbium to low-carbon austenitic steels and in the use of columbium containing welding rods.

The welding of alloy steels resolves itself into a series of specific problems said Dr. Kinzel in concluding. In each case these problems have been studied and solved, and in the case of low-alloy steels, and austenitic steels in particular, the solutions have been so successful that they may be considered to result in fool-proof welding steels and practices.

Heat Effect Studied

Results of research into the effect of welding heat on different structural alloy steels were outlined by W. L. Warner, welding engineer, Watertown Arsenal, in a paper contributed to the industrial research sub-committee of the welding research committee of the Engineering Foundation.

In a paper on the "Metallurgical Aspects of the Welding of Steel," E. S. Davenport and R. H. Aborn, research laboratory, United States Steel Corp. outlined for welding engineers the main metallurgical aspects of the two processes always involved in the making of a fusion weld. These processes are: (1) melting of the metal at the weld and its subsequent solidification; and (2) the unavoidable heating and cooling of the solid metal in and near the weld, brought about by the welding heat and its subsequent dissipation. The paper includes a section on metallurgical treatment following welding, and brief comments on the welding of alloy steels. Notes on freezing of liquid steel in a weld are given in an appendix.

What happens in flash welding and in arc welding was shown by means of high-speed motion pictures—a spectacular and highly instructive feature of the same technical session. The flash welding was discussed by W. E. Crawford and Walther Richter, A. O. Smith Corp. and the arc welding by E. Vom Steeg, General Electric Co.

Characteristics of a Coated Rod Welding Arc

Metal from a coated rod electrode passes across the arc space in the form of droplets varying in size from 0.010 to 0.001 in. or less, but occupying less than 0.1 per cent of the arc space, according to researches made at the A. O. Smith Corp., Milwaukee. L. J. Larson, who presented the data, showed how copper strip probes coated with castor oil and resin were able to catch these tiny steel particles, which are almost perfect spheres. These particles travel at speeds between 10 and 125 ft. per sec., but whether they were propelled by the explosion of included gases in the steel or not, Mr. Larson was not able to determine.

Tests also showed that the soundness of welds made with coated rods could be attributed primarily to the reducing gases, principally CO and H_2 produced by the coating. In the case of Smith welding rods, the coating is composed of cellulose and sodium silicate, and it is the former that breaks up into C, H, and O. Besides forming a reducing atmosphere and excluding air, these gases increase the arc voltage and hence the energy of the arc, which assist materially in the welding operation. This increased energy appears in the form of more heat which results in greater heating of the base plate or more penetration as it is called. The greater heat also produces greater fluidity and enables impurities to float off the surface. It also produces more uniform and thorough grain refinement of previous passes in multilayer work.

Bare wire welds in thin plate are quite satisfactory, but in plates of 1 in. in thickness or more, the strength of the weld becomes very erratic and the ductility may be practically zero. The properties of welds made with coated electrodes correspond quite closely with 0.20-0.30 carbon steel, the strength and impact values of welds being higher than those of the plate and the ductility being slightly less.

Heating by Proximity Effect

A method of selectively heating various shallow strips in the surface or edges of large metallic bodies by causing the heating current to concentrate in the selected strip was outlined by Prof. Edward Bennett, department of electrical engineering, University of Wisconsin, in a paper on "Electric Heating by the Proximity Effect." Its field of application is to industrial heating operations in which it is necessary to heat the edges or narrow surface strips of metallic conductors for such purposes as brazing, welding, annealing, hardening, enameling or alloying. The method requires a.c. at frequencies in the range of 500 to 2000 cycles per sec. Experience has not as yet been obtained with large sources of power at the higher frequencies.

Concentration of a.c. in the desired portions of conductor occurs when a second conductor carrying an alternating current is brought into proximity to the first. For example, if two pipes are to be welded together, their ends are brought close together, but not in contact. A water-cooled copper tube is wound around, but not in contact, with the pipe. When current of correct characteristics being passed through the cold copper coil, the edges of the pipe are brought to a welding heat. The coil is then removed and the pipes joined by pressure. In the case of two flat plates to be welded, a conductor is placed in the gap between the edges to be joined and a.c. is passed through the plates and the conductor in such a way that advantage is taken of the proximity effect. Only the edges of the plate are heated to welding temperature.

In the general discussion, Prof. Bennett's work was characterized as a definite contribution to the art of induction heating. The process is applicable to plate up to ¾-1 in. thick, or even thicker if sources of power are available. It was said to have been worked out in preliminary practice and patented, but has not as yet been applied commercially.

Other papers at the fundamental research sessions included "Impact Tests of Welds at Low Temperatures," by Prof. Otto Henry, Brooklyn Polytechnic Institute; "Welded Beam - Column Connections," by Inge Lyse and C. J. Gibson, Lehigh University; "Welded Structural Brackets," by C. D. Jensen, Lehigh University; and "Circuit Characteristics and Arc Stability," by S. C. Osborne, Wilson Welder & Metals Co.

Multi-Layer Oxy-Acetylene Welding

Details of a new multi-layer welding process were given in a paper on "Multi-Layer Oxyacetylene Pipe Welding," by R. M. Rooke and F. C. Saacke, apparatus research and development department, Air Reduction Sales Co. Application of the process in connection with two power piping installations was described by A. N. Kugler of the same company in a second paper on the subject.

Deposition of weld metal in more than one layer has been the general practice in electric fusion welding. "The advantages are patent," state the authors. "The ductility of cast steels may be increased by grain refinement obtained by reheating and cooling the steel through the critical temperature ranges. Every time a layer of weld metal is deposited on to another layer which has cooled to below the critical temperature, the grain structure of the unmelted weld metal is partially or wholly refined depending upon the penetration of the welding heat.

Experiments carried out on 8-in. grade A and grade B pipe with wall thickness of ½ in. and over have shown, when single and multi-layer gas welds are made under the same conditions and on the same wall thickness, that the physical characteristics, particularly the ductility of the multi-layer welds are not only superior, but the welding time as well as the filler rod and gas consumption are considerably lower.

Superior physical characteristics of the multi-layer welds are attributed to two factors. First, the weld metal is deposited in better condition due to the reduction in size of the molten puddle. With the increased linear speed of welding, the molten metal is less turbulent and worked at a lower temperature; it is exposed to the atmosphere for a shorter period of time and is more completely protected by the envelope of welding gases, and it is more readily bonded to the parent metal free from cold shuts or slag inclusions due to the simplification of welding.

Improved Ductility

Second, the weld metal ductility is improved markedly with very little sacrifice of tensile strength by the grain refinement resulting from the welding heat of successive layers of weld metal. This latter grain refinement is only present if the layers of weld metal are deposited in such lengths that the weld metal is reheated through the critical temperature.

Three major reasons were given for the lower efficiency of the single layer weld as compared with the multi-layer method. They are: First, in a single layer weld a great deal of the hot gases from the oxyacetylene flame never touch the weld but pass through the opening at the bottom of the vee and are almost useless so far as utilization of their thermal energy is concerned. In a multi-layer weld, this situation occurs only with the first layer and then at a smaller gas flow and a much more rapid linear speed of welding. Second, the cross section of the single layer weld is much larger than the multi-layer weld which is again an indication of the excessive consumption of thermal energy in penetrating the side walls of the pipe deeper than necessary. Finally, the single layer weld being more difficult to make on the heavier parent metal sections becomes excessively slow due solely to the difficulties of the welding operation.

Resistance Welding of Dissimilar Metals

In order to obtain a balanced heating effect between a high and low resistance metal or a high and a low melting point metal it is necessary to protrude the metal varying distances from the welding clamps. Copper, for example, should protrude double or triple the distance from the clamps that steel should. This was brought out in a paper by R. T. Gillette, welding engineer of the General Electric Co.

Mr. Gillette also indicated how aluminum could be melted to copper by starting out with a relatively low pressure until the proper welding temperature is reached and then using a relatively high pressure to push up the weld. The high pressure extrudes practically all of the aluminum-copper alloy from the joint, which in itself is very brittle. Exceedingly strong welds are made in this way that

break outside the weld point. In this particular example the aluminum projects ⅜ in. from the dies and the copper ⅞ in. These extensions were determined experimentally.

Because practically all of this work must be determined empirically and by experimentation it is good policy to make hand-made samples or models before completing final drawings of press dies, welding machines, jigs and fixtures. By doing this much better methods of making parts and tools are often suggested and it is much cheaper to make changes in design on paper than after tools and fixtures are completed.

Rolled Steel in Machine Construction

Machine construction employing welded rolled steel is still meeting with a great deal of sales resistance among the engineering profession, according to H. G. Marsh, Carnegie-Illinois Steel Corp. Many machinery manufacturers take great pains to conceal the fact that welding has been used and try their best to copy cast design. Many machinery companies do not use welded construction in their design because they believe that only a welding technician can design welded structures. Mr. Marsh believes that with standardized data on welds comparable to what is available on riveting, a designer of presses, for example, who has spent years in that line will design a better welded press than the best welding technician. The way to break down the existing sales resistance to welded construction is to start the thousands of designers in this country using it and the way to start them is to give them simple and reliable data on welds. It is not necessary that the designer become a welding technician. Supplied with reliable and workable data, with his keen insight and ingenuity, he will quickly grasp the possibilities of welding and lift welded machine design to new heights.

Welding Heavy Machinery

In discussing some of the problems of welding heavy machinery, C. A. Wills and F. L. Lindemuth of the Wm. B. Pollock Co. pointed out that sometimes a certain thickness of plate may be sufficient to carry the load, but not sufficient to enable the welder to build up the required shape and size of weld. In such instances, the thickness of plate should be increased or the design otherwise changed to meet the welding requirements. At the same time the authors pointed out that too much welding can have disadvantages. Deposited weld material may cost as much as a dollar or more per pound, depending upon the rod used to make the weld. Hence excessive welding runs up the cost with no compensating advantage. In fact, distortion upon cooling becomes greater since the more weld metal there is, the greater the distortion will be. The authors believe that these welds tend to relieve themselves with age, but a speaker from the floor challenged them on this point, indicating that the aging of cast iron, owing to its much lower modulus of elasticity, was no criterion as to the effectiveness of aging of welded steel.

Where accurate dimensions or maximum strength are necessary, the internal stresses in the weld metal should be removed either by cold working or peening, or by heating it to a sufficiently high temperature for a sufficient length of time. This heating for stress relieving should not be confused with annealing or normalizing, in which refinement of grain structure occurs. Peening of welds is an uncertain method of relieving stresses because it is difficult to tell just when the right amount of peening has been done. If it is overdone, tension stresses in the weld metal are simply changed to compression stresses and in addition, the weld metal may have been damaged.

Stress relieving by heating has its disadvantages in that distortion of the piece may occur, particularly if there are light sections welded to much heavier sections. Experience has shown that such difficulties can be overcome (a) by designing the structure with permanent or temporary stiffeners for thin flat surfaces; (b) by changing the shape so that the effect of the welding stresses will be minimized; or (c) by changing the amount of welding. In changing the amount of welding, the minimum permissible amount is deposited at one point while more than is actually needed for strength is deposited at others in order to balance the stresses throughout the structure so that its shape will not change appreciably during fabrication and heat-treating.

Occasionally in highly stressed structures there may be difficulty in getting the necessary amount of welding in the space available. The amount of welding along the edge of a plate, for example, can be increased by serrating the edge. Another scheme is to plug weld, that is, to punch or drill holes through one plate of an overlapping pair and fill the holes with weld metal. This method is not recommended, however, because it is difficult to obtain adequate penetration at the bottom of the weld and between successive layers. A combination of welding and rivets or fitted pins is a better solution, although theoretically this is not sound because of the indeterminate nature of the stresses.

A. E. Gibson, vice-president, Wellman Engineering Co., in discussing this paper, indicated how his company combined normalizing and annealing in stress relieving welded low-alloy steel structures. Pit annealing is used, and in cooling from the critical, the cover is removed so that heat is lost only by radiation and not by direct air drafts. Below 1000 deg. F. the furnace cover is replaced and a slow furnace cool takes place.

Referring to some of the commercial aspects of welding, Mr. Gibson pleaded for buyers of welded machinery to make their specifications clearer for bidding purposes. There is a vast amount of difference between the cost of making a full penetration weld as against using a ⅜-in. fillet weld in abutting plates. Very often this is left up to the particular bidder and as a result there is wide disparity in quoted prices.

Modern Resistance Welding of Light Products

Automotive engineers are no longer suspicious of resistance welding, as other engineers seem to be regarding its application to machine structures, according to A. E. Hackett, of the Thomson-Gibb Electric Welding Co. Butt, flange, spot, projection and seam welding are in common use today in both automobile plants and in refrigerator cabinet plants. Projection welds are rapidly superseding spot welds in both these fields and in other industries. In mentioning some of the more interesting applications of resistance welding, Mr. Hackett called attention to the flash welding of strip in a hot rolled strip mill, the butt welding of stain-

less steel bicycle rims and the spot welding of steel to cast iron, an entirely new application for which no data are yet available. Seam welding has many advantages, particularly for such applications as ball floats, where it is necessary to keep down the amount of heat that enters the product in order to avoid distortion. Gasoline tanks for automobiles are now being seam welded at the rate of 200 in. per minute. By using a gas tank with square cornered flanges, it is possible to seam weld it in a machine using two wheels, one on either side, and using two set-ups, one at right angle to the other. This means it is possible to weld at the rate of 400 in. of total seam a minute.

A new type of automatic spot welder now being used at one of the automobile body plants welds the gutter to the roof panel at the rate of 600 spots a minute. The welding head is carried on a rail and on the return travel, the head spot welds alternately between the welds previously made. Pressure and current control is entirely automatic.

Welding Steam Railroad Rails

While practically 85 per cent of street railway joints are thermit welded today, J. H. Deppeler, Metal & Thermit Corp., pointed out some of the latest advances in the welding of open track for steam railroads. Street railway tracks are at an advantage in that the rail is usually tightly held in a solid concrete foundation and changes in temperature are kept within fairly well defined limits. Besides, the track is constrained from any sideways movement. It was rather expected that in welding long sections of exposed track there might be a tendency of the track to weave or buckle due to expansion in the summer time. Careful measurements made in a one-mile section of experimental track indicate that the maximum movement in any direction is less than 1/16 in. between summer and winter conditions.

The work of welding is usually carried on between April and November when no freezing temperatures are encountered and it is estimated that the maximum stress set up in the rail amounts to 19,000 lb. per sq. in. in either tension or compression.

In making the weld the head is carefully finished and a ½-in. slot is cut in the lower portion of the rail joint up to a point within 1 in. of the head. The rail ends are first preheated to 1700 to 1800 deg. F. and the weld itself is made at a temperature of 2600 deg. The lower portion of the rail is fused by a slug of thermit metal while the head of the rail itself is pressure welded by upsetting the ends mechanically when the rail metal has been brought up to heat. This pressure welding is accomplished by hand wrenches on turnbuckle nuts. Heat for this pressure weld is supplied through the slag which surrounds the head.

It may be remembered that thermit welding consists essentially of combining ferric oxide and virgin aluminum powder and that equal quantities of iron and alumina slag are formed.

The first installation of exposed welded steel rail was made on the D. & H. Railroad at Albany. In one section of track the rails were welded consecutively and in another section rails were welded in four sections which were later welded together. During the following winter when the temperature dropped to minus 24 deg. F. this latter track broke in four sections due to contraction. Since that time all steam railroad rail has been welded consecutively, and no failures have been reported.

An experimental section of track near Schenectady, N. Y., was welded on flat cars and then thrown down in place. It was found that the rail took the curves nicely without slipping off the flat cars when it was being brought into location.

Outlines Principles of Surfacing

Improvement in service life and reduction in over-all and in operating costs were reasons cited by E. W. P. Smith, consulting engineer, Lincoln Electric Co., for the use of surfacing in the fabrication of various types of equipment.

Service life of equipment involves load conditions, which, on the basis of rate application, he classified as uniform, impact and vibrating. Other factors include wearing conditions, such as abrasion and corrosion, and temperature conditions. In the case of surfaces deposited by arc welding another consideration is the condition of the surfacing metal immediately after it is deposited. The surface either possesses its complete characteristics as deposited, or it must receive some subsequent treatment, such as peening or heat treatment.

Electrodes are available for deposition of different types of surfaces, and each of these may be grouped according to their ability of their deposits to resist impact; abrasion; impact and abrasion; corrosion; and temperature. When the type of deposit required is known, selection of a suitable electrode may readily be made.

Surfacing by welding is very economical in many cases. Usually the surfacing metal, which is comparatively expensive, is placed on a metal of rather low cost. The expensive metal need not be used except where it is in direct contact with the loading. Therefore, the total cost including surfacing need never exceed the cost of the original single-metal construction, said Mr. Smith.

Cost calculations, including a graph showing the percentage of total weight of surfacing material which may be used without exceeding the original cost of the part when made of a single metal, was an interesting part of Mr. Smith's paper, which was on "Principles of Surfacing by Welding."

Two Separate A.S.M.E. Welding Sessions

Papers on the welding of various non-ferrous metals featured the first of the sessions arranged by the American Society of Mechanical Engineers, Oct. 23. They were: "Application of Copper Alloy Welding," by I. T. Hook, American Brass Co., Ansonia, Conn.; "Welding of Monel Metal and Pure Nickel," by F. A. Flocke and J. G. Schoener, International Nickel Co., New York; and "Welding of Aluminum Alloys," by G. O. Hoglund, Aluminum Co. of America, New Kensington, Pa.

Problems in choosing between a cast machine part and a weld fabricated part were discussed in a comprehensive paper by J. L. Brown, Westinghouse Electric & Mfg. Co., East Pittsburgh, at the second session. Discussion of the "Use of Magnaflux for Inspecting Welds," and a paper on "Radiographic Inspection of Welded Refinery Equipment and Steel Plate Construction," the latter by H. R. Isenburger, St. John X-Ray Service, Long Island City, N. Y., were other features.

Abstracts of A. S. M. Papers

CONCLUDED FROM PAGE 34A)

ferred to carbon steel and steel of the type of steel No. 3, where the dimensions are such that the latter steels harden all the way through. Specimen No. 5 is a steel, however, with especially small deformation in both small and large dimensions and may, therefore, be considered as the most all-around steel, as far as permanent shape is concerned.

In order to obtain the least deformation of a tool steel, it should have the following qualities:

(1) It should be possible to allow the slowest possible cooling velocity during quenching.

(2) A relatively large amount of austenite should be retained without impairing the hardness.

(3) The amount of carbide not participating in the transformation during quenching should be large.

An increase of the quenching temperature does not necessarily increase the deformation because the increased heat stresses might be compensated by the transformation stresses. When tempering hardened objects, the dimensions are changed on account of structure transformations and also on account of release of strains. When tempering at high temperature with rapid cooling, deformation might also develop on account of heat stresses.

Strain release seems to occur rapidly up to about 200 deg. C. (392 deg. F.) and thereafter more slowly. By studying the dimension change during tempering, it is possible to obtain some idea concerning the stresses after hardening.

Only in exceptional cases can complete restoration of dimensions by tempering be counted upon. From the experiments just described, it is possible to determine which drawing temperature or temperatures give the best results with the test pieces and steels that were selected.

In order to find some simple way to determine the tendency of a steel to change dimensions during hardening, it would seem best for the small size samples to measure the dimension change of the inner diameter on a ring about 15 mm. round by 5 mm. round by 10 mm., and for the large size samples to measure the dimension change of the height of a cylinder about 50 mm. round x 50 mm.

Kelvin Low-Cost Air-Conditioned Home is Presented

THE first public presentation of the Kelvin home, electrically equipped and air-conditioned dwelling for families of moderate means, was made at a formal luncheon and inspection tour of a number of the homes already erected, in ceremonies held in Detroit on Oct. 14.

Based on standardized floor plans with varied exterior designs developed by Kelvinator Corp., Detroit, the homes can be readily adapted by the individual architect to local conditions and the desires of the owner. The homes will be erected by local construction firms throughout the country, employing local labor and capital, and making principal use of local material.

Among the members of the Kelvin home celebration committee who sponsored the luncheon and presentation was C. R. Hook, president of the American Rolling Mill Co. Mr. Hook is vice-chairman of the Committee for Economic Recovery and is also a member of Secretary Roper's Business Advisory Council. In such capacity he has exhibited a broad social viewpoint toward national affairs and particularly toward the housing problem. Mr. Hook believes that it is not too much to expect a housing boom for the next decade in which 500,000 homes could legitimately be constructed annually to meet present and future needs.

The basic idea behind Kelvinator's venture into the housing industry has been to develop a unit structure in which the cubical contents and surface exposure are constant for a single air-conditioning unit. Through different architectural treatment of the exterior and various arrangements of rooms, it has been possible to provide approximately 45 different styles of homes on a single, approximately square basement plan. The houses which the group visited were designed to sell for approximately $7,000 and with lot and two-car garage would sell for between $8,000 and $9,000.

In connection with the unit idea, Kelvinator Corp. has developed a so-called "package" which includes a 6 cu. ft. electric refrigerator, a four-burner electric range or gas stove, an oil burner or equivalent gas burner and the Kelvinator year-round air conditioner. This air-conditioning unit is encased in a structural steel frame and is suspended from the ceiling of the basement adjacent to the oil burner unit. It consists of a glass wool air filter, copper fin heating coils, a humidifier, copper fin refrigerant coils for use in summer, and a blower to force the treated air through sheet steel ducts. Both a thermostat and a humidistat are included as part of the control equipment, so that both constant temperature and constant humidity may be obtained throughout the heating season. Humidification is obtained by passage of the air over surfaces of water contained in a series of galvanized steel trays. In summer, refrigeration is provided not only to cool the air, but also to condense the excess moisture and thereby reduce the humidity. The system also provides a damper which allows cool night air to be pumped through the building, thereby saving power on the house refrigerator unit, which is installed in the basement separate from the food refrigerator located in the kitchen. Attached to the automatic boiler unit is a standard hot water boiler which is heavily insulated to conserve heat. During the summer season the oil-burning unit can be set so as to automatically hold the temperature in this boiler without the necessity of supplying steam to the heating coil.

Price of the Kelvinator package alone installed in the building is $1,250, including the installation of the galvanized steel ducts, of which there are two to each room, one for heated air at the top, the other for cold air return near the base board. In a six-room house in Detroit, the average operating expense for a year, including cooking load on the stove and ordinary lighting, is $183. Kelvinator officials estimate that public acceptance of this low-cost and air-conditioned home will bring a $135,000,000 annual volume to the air-conditioning industry within the next decade.

Kelvinator has built eleven of these homes in Detroit and 50 throughout the country.

NOW LET BUSINESS ALONE

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By MORGAN FARRELL

Director Chilton Bureau of Economic Research

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7th in the Series on the American System of Enterprise.

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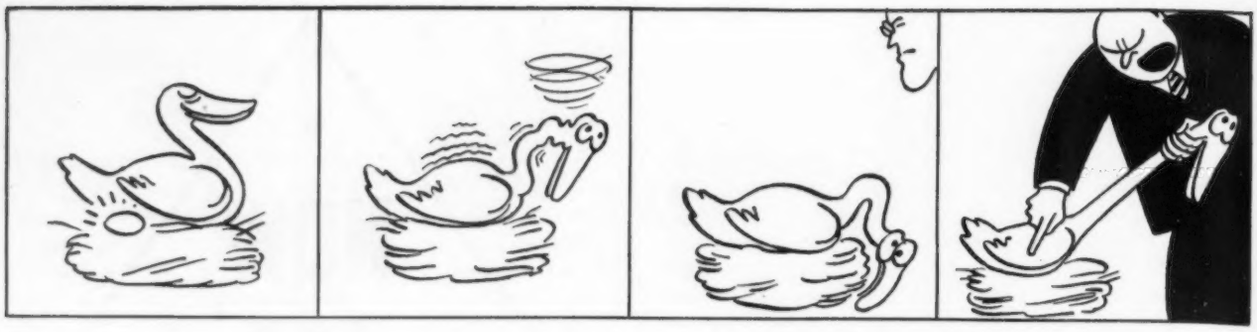
IT is now apparent to most people with reasonable powers of observation that business has become well in spite of the doctors. The time-tried American System of Free Enterprise has again justified itself as it has repeatedly done in the past.

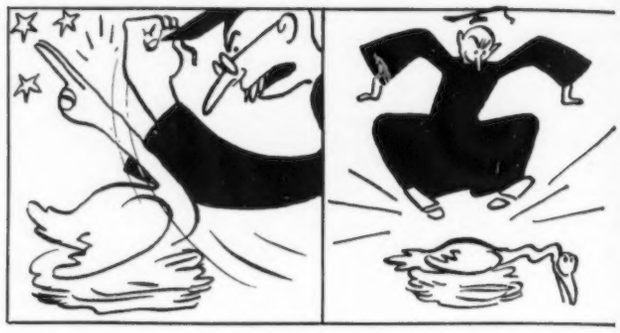
Our business has struggled along with Government regulators hanging on to its coat-tails in crowds; with threats of reorganization, taxation, legislation; with an outlook that the worst is yet to come—and still it has come through. Nearly all the usual business indices are now ahead of the 1923-5 averages.

Those who have studied the course of past cycles of business depressions and recoveries, particularly the charts comparing the Civil and World War cycles, used to illustrate a previous article in this series, know that the present status of recovery is the resultant of many forces. They also know that the chief among them is, necessarily, the aggregate efforts of all individuals to do business, in order to make a living for themselves and their families.

This is as true of large as of small enterprises as well as of the usually overlooked businesses of middle size. Those, who were not actually driven to the wall during the worst period of the depression, have continued trying to do business even though partial in volume and unprofitable in result. Countless enterprises carried on for years at a loss.

The economic body is a huge and complex organism composed of innumerable human cells. It seems to pass through the same cycle in illness as the human body. When it is sick the healthy cells cure it. When they have overcome the breakdown of other cells or the invasion of destructive bacilli from without, the body starts to improve and soon is well again. The doctors have little to do with it. The health of the cells and the determination of the patient to get well are the major factors. But, of





course, the doctors take all the credit for the cure.

That it is the strength and vitality of the American System itself, and not the exclusive efforts of any Government Administration, which has led up to this stage in the revival of business, is evident from such considerations as the following:

The Administration's Attitude

The antagonistic attitude of the Administration toward business, as shown continuously by the public utterances of the Executive, certain Cabinet officers and administrative heads and as reflected by Federal legislation, can hardly be claimed to furnish an atmosphere highly encouraging to the growth of business.

Who are the "economic royalists," for instance, who founded the "new economic dynasties?" How and when was "individual initiative crushed in the cogs of a great machine?" What is this war we are waging "for the survival of democracy?" War against whom?

Let us examine these questions a little more closely.

"Economic royalists" might refer to the financiers, the railroad builders, the developers of natural resources or the founders of new industries—men like Morgan, Vanderbilt, Gould, Fisk, Harriman, Hill, the Guggenheims, Carnegie, Rockefeller, Woolworth, of 40 or 50 years ago. Nearly all of them initiated immense enterprises, which added greatly to the wealth of the Nation, and which still carry on, but they could hardly be called economic dynasties, for, in all but a very few instances, control of the founders' enterprises has passed out of the hands of their sons and other appointed successors into those of innumerable stockholders.

The same is true to an even greater degree of the present group of automobile, steel, oil and other industrial and business leaders—Sloan, Swope, Grace, Teagle, Gifford, Taylor, Chrysler, Ford, who could conceivably have been intended by the now famous designation. Of the men in this class, only a few have sufficient control of their business to pass it on to their own appointees, let alone their descendents.

It is not especially apparent, then, who are the "economic royalists," nor where are the "economic dynasties."

If this is not very clear it is no more so that "individual initiative was crushed in the cogs of a great machine." When did all this happen? We thought we had proven, in earlier papers, that the principal component of the American System is the free play of that same individual initiative. Must we start all over again?

An Incompetent Statement

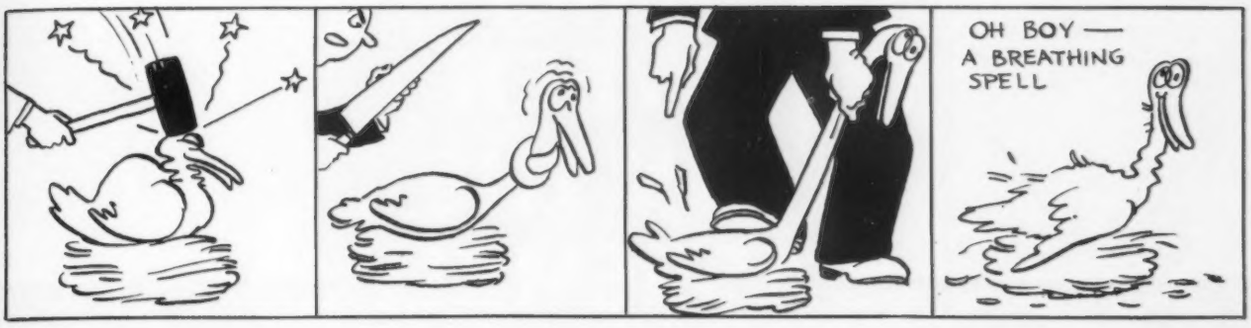
Until proof of the statement that initiative has been crushed by our System is forthcoming, men of judgment, with a knowledge of events, will simply reject the statement as incompetent. Consider the number of retail stores in 1929—1,543,158, which did not materially alter through 1933. They did a business of $49 billion and employed 5,189,670 including the proprietors. Of the total, chain-stores numbered 141,603 in 1933, less than 10 per cent. It does not look as though their cogs were crushing the others out of existence.

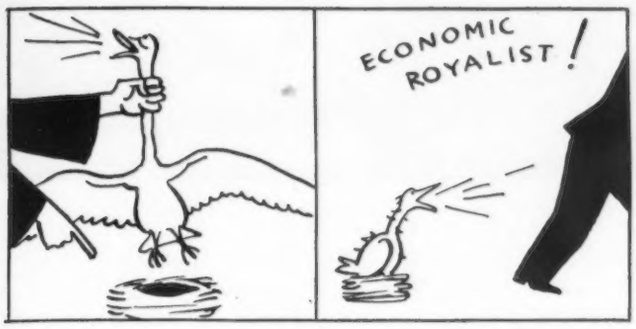
In the same way, out of 210,959 manufacturing establishments in 1929, doing a business of $5,000 a year or over, only 11,763 exceeded $1,000,000 in annual output. Their cogs, too, seem to be employed in turning out products rather than in grinding initiative into dust.

Again, the citizens of America would like to be informed about the war *we* are waging "for the survival of democracy." Who are "we?" What kind of democracy? What is democracy?

"Government directly by the people collectively," says the *Standard Dictionary*. Collectively! Then it is not government by the so-called "workers" exclusively, with all having an income of $3,000 and over disfranchised, presumably because they are not "workers"—their incomes are just handed to them. It would hardly do to disfranchise 4,000,000 people, especially as they pay practically *all* the income tax, amounting to one billion in good years.

But back to the war: Obviously, the only acceptable definition of American democracy is that presented by our system of Government as evolved through 150 years of tests of our Constitution and the settlement of differences of opin-





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ion regarding certain of its provisions, by one of three measures: Decisions of the Supreme Court, Amendment and Civil War.

We have tried all three. So, it would seem that the American idea of democracy should be solidly crystallized by this time.

Who Leads the Attack?

Now who is attacking that conception of democracy? The people as a whole? Or any important part of the people? There is nothing in the news of the last three and one-half years to that effect. But there has been a great deal of official criticism of the Supreme Court decisions, incitement to class antagonism, enactment of discriminatory laws, assumption of extra-Constitutional powers, self-creation of a Governmental oligarchy, abuse of authority by an overwhelmingly majority Administration — which have shaken our balanced democracy no less than our balanced Constitution to their foundations.

Well, business, meaning by that, the 1,500,000 stores, the 210,000 manufacturing establishments, not to mention our transportation system, utilities, agriculture and all the millions of enterprises, powered by individual initiative, began to carry on through its own inherent vitality. And it has reached its present state of recovery in spite of such legislation as the Social Security Act, the Government Contracts, Transportation, Price Regulation and Revenue Acts, to name but a few. Each of these can readily be demonstrated as hampering rather than encouraging business as a whole. The burden of additional bookkeeping, imposed by each new measure upon business would be enough but that is not all.

Let us look at just a single aspect of some of these laws: The method of collecting the employees' part of the tax under the Social Security Act by withholding it from the pay envelope is certain to promote class antagonism because it forces the employer into the highly distasteful position of taking toll from the wages of toil, even though he acts only as an agent.

Again, take the Robinson-Patman Anti-Price Discrimination Act. Here the usual presumption in law that even a criminal is innocent until he is proven guilty is reversed. The burden is upon the business man to prove that he is not guilty of price discrimination. There is no definition of either price or discrimination in the Act. So how is the presumed guilty wretch to prove himself innocent? And just to make sure, the Act declares his offense a crime. And, without an interpretation, how can any business man know whether he is violating the Act or not?

Under the Walsh-Healey Government Contracts Law, the manufacturer, contractor or supplier is forced to adopt a scale of pay and a 40-hour week throughout his business, if he wants any Government work. And this in the face of high court decisions that the Government cannot interfere with the right of contract as between employers and employees.

The Revenue Act of 1936 will have the effect, by reducing surplus, of compelling companies of all kinds to sail closer to the winds of depression. So, instead of trying to stay open in hard times and carry on with as many employees on the payroll as possible, they will, in all probability, shut down altogether, not having the money to do anything else.

Obvious Hampering Effects

The defects of these and other recent and radical enactments are so painfully obvious that it is wearisome to repeat them. They have one trait in common, however, and that is their hampering effect upon business and business initiative.

One cannot but think, upon analyzing all the taxes, regulations, obstructions and encumbrances heaped upon business by the thousands of law-making bodies throughout the Nation, that legislators must be gifted with a high degree of optimism to expect the structure to stand up under the load, much less develop new strength.

The fact is, of course, that the structure will give way under an excessive load, not only of taxes but of any restrictive legislation. It has happened before and can happen again. As long ago as 1807, Jefferson's Embargo Act, which put an "instant stoppage on all American vessels in our ports, if bound for foreign ports" destroyed our

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THIS WEEK ON THE ASSEMBLY LINE

. . . Automotive production continues to gain with many companies now in full swing, although Ford is not yet a factor.

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. . . Rise in dealer orders points to much larger retail volume this fall than a year ago.

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. . . Both Nash and Kelvinator admit merger plans have been discussed, but rumor of removal of automotive operations to Michigan is scouted.

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. . . Plymouth features rubber insulated bodies, direct-acting shock absorbers, hypoid gears, safety interior, bigger, roomier bodies.

DETROIT, Oct. 27. — Automotive production again shot up last week, advancing 30 per cent over the previous week, although total production is still slightly below that for the same period last year, owing to the fact that Ford Motor Co. is not yet in volume production.

It is estimated that Ford assembled less than 100 cars last week, although material for certain parts had been coming in at the rate of 2500 jobs a day. Ford has large banks of such components as motors, transmissions and rear axles but it only takes a shortage in one part of the car to hold up the entire line. Last-minute changes in brake details necessitated changing dies and other tooling and these new assemblies are just beginning to come into the plant. Chevrolet is off to a much faster start and last week assembled approximately 3400 motors and 175 completed cars daily at the Flint plant. Every effort is being made at the present time to increase assemblies at Bloomfield, N. J., and Tarrytown, N. Y., which would indicate that dealers in that area will first be supplied with the new cars scheduled for announcement on Nov. 7.

Plymouth is going at practically full swing. Only minor changes were made in the motor this year and a bank of approximately 100,000 was built up during the shutdown period. Dodge Main was one of the first plants to receive the new Gleason hypoid gear-cutting equipment and hence was in position to supply Plymouth and other Chrysler units with hypoid axles without delay.

DeSoto and Chrysler production is going along surprisingly well despite the fact that a good many kinks have yet to be worked out of the new six-cylinder motor line at the Jefferson Avenue plant. The motor manufactured here goes into both the Chrysler and DeSoto Sixes and also into the Dodge truck. Assembly lines have been kept going with motors made on temporary tooling on existing equipment until the brand new line of advanced production machinery really gets going.

Oldsmobile has not been so fortunate and the only six-cylinder engines built to date have been practically tool room jobs, since it was not found expedient to attempt to manufacture '37 jobs on temporary tooling until the new line could get going. Like Chrysler's Jefferson Avenue plant, Oldsmobile also boasts an entirely new six-cylinder block line which will probably break all record lows as far as total machining time and direct labor costs are concerned.

Output Continues to Gain

Automotive output for the United States and Canada advanced to an estimated 64,310 units for the week ended Oct. 24, as compared with 50,585 in the preceding week and 66,516 in the comparative

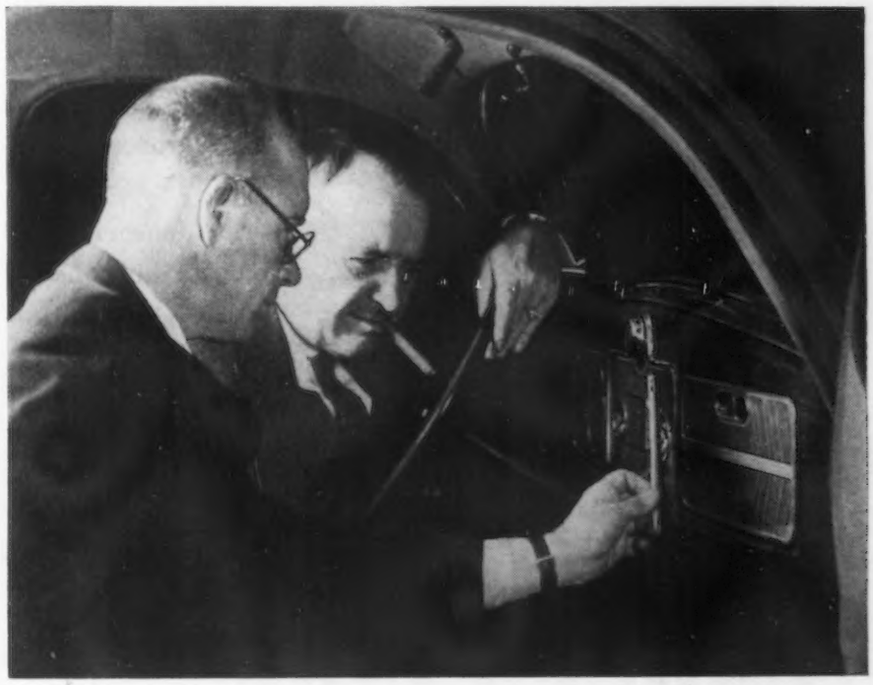
period a year ago, according to Ward's Automotive Reports. The survey predicts that a rate of close to 100,000 units a week is in prospect within the next three or four weeks. Of this current production, 31,700 units are credited to General Motors, compared with 19,750 the previous week, whereas the Chrysler comparisons are 19,000 to 17,725. G.M.'s chief gain has been in Chevrolet output.

Department of Commerce figures for September show 135,130 cars and trucks produced in the United States and 139,785 for United States and Canadian production combined. This latter figure compares with a total of 275,951 vehicles in August, 1936, and with 95,128 total units in September, 1935. Of the United States production, 90,597 were passenger cars and 44,533 were trucks. Passenger car sales for September are estimated by R. L. Polk & Co. at between 200,000 and 205,000 units, based on reports from 58 per cent of the industry. If this estimate proves correct, the gain in passenger car deliveries for the month will be 35 per cent higher than for the same month last year.

Predicts Gain in 1937

One indication of automotive thinking is well illustrated in a remark made by Alfred P. Sloan, Jr. of General Motors, at a recent sales convention. "The economic conditions are with us in 1937 and I am sure it will be a better year for the automobile industry than 1936, but it will not be because of the New Deal. Quite the contrary. The same forces that caused us to go down during the depression years have reached the bottom and are on the rebound." Further improvements in business in 1937, regardless of the outcome of the presidential election, were also forecast by C. P. Simpson, vice-president of Pontiac, in speaking before a dealer group last week.

Sales reports coming from individual companies bear out these opinions. Buick, for example, has approximately 40,000 orders on hand for new cars following its announcement during the week-end of Oct. 17. The number of orders surpassed by more than 10,000 those received by this time a year ago following the introduction of the 1936 cars. Production is being speeded up to reach a volume of more than 1200 cars a day at the Flint factory and the new General Motors assembly plant in California. Output during the past week totaled more than 4500 units, averaging more than 900 cars daily at Flint. During the 1936 model run, Buick's daily average was considered to be 800 and the 1937 pro-



CHRYSLER'S contribution to safer driving is an instrument panel swept clean of all dangerous projections by recessing controls flush with the surface. This is the Plymouth panel. Even the windshield control crank folds back into itself.

BULLARD

"Spiral Drive" VERTICAL TURRET LATHE

for Greater Profits

ACCURACY with heavy cutting is only possible when machine design and construction are extremely rigid. Accuracy minimizes rejects. Fewer rejects mean more Profitable Operation. Inasmuch as Bullard Vertical Turret Lathes assure a high degree of Accuracy, they are Universally acknowledged as Profitable Equipment Investments.

As a matter of fact, there are many installations where these Vertical Turret Lathes have Saved 50% and 60% over the Best Previous method. If others are Profiting with Bullard installations, so can you.

Ask for estimates on your work.

THE BULLARD COMPANY
Bridgeport, Connecticut

gram has been keyed up to produce 1000 assemblies a day at Flint. Buick has scheduled approximately 20,000 cars for October and more than 21,000 for November, subject to possible upward revisions during that month.

Chrysler to Invade Low-Priced Field

Chrysler sales division reports that it already has over 11,000 orders from dealers, although no public announcement has yet been made, and this division of the corporation is talking about doubling its 1936 volume next year. Part of this threat is carried by the new Chrysler Royal, a car which is going to invade the low-priced field, according to company announcements. No price tag has been put on this car, but it is expected that the base price will be around $750. As in the case of General Motors, there seems to be no objection on the part of the corporation as a whole to inter-corporation competition, since this car will be very close to the range of prices on the new DeSoto. In fact, the principal difference between the Chrysler Royal and the DeSoto will be front end styling, since the engine, transmission and axle units are the same. To prepare for this enlarged volume Chrysler has increased its manufacturing facilities by the addition of several large buildings, one of which measures 938 x 80 ft., and by the purchase of much new and improved machinery. As mentioned above, the new cylinder block line on which most of the machinery budget was expended will make the block for both the DeSoto and the Chrysler Six. Both Chrysler and DeSoto have also made extensive plant rearrangements with DeSoto's assembly line now housed on the West side of town in its own quarters.

BIGGER, roomier bodies completely insulated from the frame by rubber spools carried on outriggers feature the 1937 Plymouth. Like some of the Dodge details illustrated last week, it also has a hypoid rear axle drive, airplane-type shock absorbers and steel disk wheels. One of the striking features of the new Plymouth are the massive front fenders. Base price begins at $510 f.o.b. Detroit.

Another indication of the trend in sales comes from Graham-Paige, which announced its line a few weeks ago. During the first 15 days of October, dealer orders rose to 3505 cars, or more than twice the total for the entire month last year. The company has enough orders on hand so that by Nov. 15 it will have shipped as many cars as it did during the entire fourth quarter, 1935. Production at the revamped and consolidated plant in Detroit is being stepped up rapidly to take care of the large bank of orders now on hand.

Kelvinator-Nash Merger Talked

Concurrently with the announcement of the 1937 Nash and Lafayette cars comes the report that the Kelvinator Corp. of Detroit and Nash Motor Co. may merge. Both Charles W. Nash, chairman of the board and George W. Mason, president and chairman of Kelvinator, have admitted that discussions along such lines have taken place. Meetings of the board of directors of both companies will be held today (Tuesday). Mr. Nash has indicated that his name will dominate any deal that might be consummated and that the company will continue to do business at the old stand under its own name and headed by himself as chairman of the board. There seems to be little truth to the rumor circulating in New York that manufacturing activities would be shifted from the Nash plants in Kenosha and Racine, Wis., to Detroit. It must also be remembered that Nash now wholly owns the Seaman Body Corp. of Milwaukee and it would take some pretty powerful reasons to abandon these manufacturing facilities in Wisconsin. On the other hand, the labor situation in that state, particularly at Racine, has been none too happy a one and this might offer an excuse. Kelvinator, incidentally, is completing a

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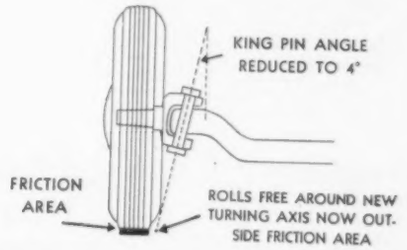

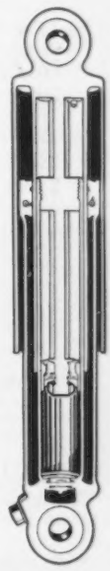

SLOTS (at left) in the form of an inverted "U" are made in the Plymouth piston to permit closer precision fit in the cylinder bore and to eliminate piston slap.

Easier steering (above) and particularly easier parking is attained by reducing the kingpin angle from 9 to 4 deg. on the new Plymouth so that the wheel rolls around a turning axis outside the friction area between tire and rod.

Cross-sectional view (at right) of direct-action, low-pressure telescopic shock absorbers operating with a volume of oil five times greater than that found in conventional types. These direct action "shocks" will be found in many cars this year, as well as in the Plymouth.

Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available.

	September, 1936	August, 1936	September, 1935	Nine Months, 1935	Nine Months, 1936
Raw Materials:					
Lake ore consumption (gross tons)[a]	4,026,690	3,968,845	2,654,278	21,824,386	31,434,081
Coke production (net tons)[b]	3,994,741	3,993,602	2,892,530	25,361,396	33,112,191
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	2,730,293	2,711,721	1,776,476	14,857,025	21,564,508
Pig iron output—daily (gross tons)[c]	91,010	87,475	59,216	54,423	78,703
Castings:					
Malleable castings—production (net tons)[d]	.....	42,253	36,996	333,053	.....
Malleable castings—orders (net tons)[d]	.....	45,179	35,658	317,014	.....
Steel castings—production (net tons)[d]	.....	81,574	35,411	282,433	.....
Steel castings—orders (net tons)[d]	.....	59,393	29,995	292,361	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[c]	4,161,108	4,195,130	2,825,004	24,051,412	33,605,304
Steel ingot production—daily (gross tons)[c]	160,043	161,351	113,000	103,225	143,612
Steel ingot production—per cent of capacity[c]	72.92	73.52	51.04	46.63	65.44
Finished Steel:					
Trackwork shipments (net tons)[c]	5,722	6,401	2,962	32,619	52,931
Steel rail orders (gross tons)[e]	25,800	5,800	7,400	324,557	684,828
Sheet steel sales (net tons)[f]	255,557	207,781	196,423	1,754,861	1,866,297
Sheet steel production (net tons)[f]	213,706	202,456	190,701	1,768,712	1,908,471
Fabricated shape orders (net tons)[g]	.....	95,390	90,161	777,967	.....
Fabricated shape shipments (net tons)[g]	.....	127,106	97,667	825,812	.....
Fabricated plate orders (net tons)[d]	.....	28,319	31,105	173,085	.....
Reinforcing bar awards (net tons)[e]	18,755	33,770	109,835	245,975	274,365
U. S. Steel Corp. shipments (tons)[h]	961,803	923,707	614,933	5,341,223	7,867,707
Ohio River steel shipments (net tons)[i]	95,705	113,560	92,898	671,511	785,381
Fabricated Products:					
Automobile production, U. S. and Canada[k]	135,130	275,951	95,127	3,066,040	3,336,296
Construction contracts, 37 Eastern States[l]	$234,270,500	$275,281,400	$167,376,200	$1,191,697,700	$2,041,627,200
Steel barrel shipments (number)[d]	.....	588,660	622,187	4,811,793	.....
Steel furniture shipments (dollars)[d]	.....	$1,438,611	$1,361,449	$10,811,995	.....
Steel boiler orders (sq. ft.)[d]	.....	1,074,597	575,031	4,311,651	.....
Locomotive orders (number)[m]	24	3	7	28	158
Freight car orders (number)[m]	3,100	3,225	110	7,293	37,348
Machine tool index[n]	118.5	127.5	80.0	†108.5	†132.0
Foundry equipment index[o]	161.0	145.4	128.5	†111.8	†155.3
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	60,697	53,158	299,255	.....
Imports of pig iron (gross tons)[p]	.....	12,524	14,357	81,930	.....
Imports of all rolled steel (gross tons)[p]	.....	28,216	22,970	152,318	.....
Total iron and steel exports (gross tons)[p]	.....	295,341	244,419	2,384,467	.....
Exports of all rolled steel (gross tons)[p]	.....	89,128	65,199	642,903	.....
Exports of finished steel (gross tons)[p]	.....	79,617	58,565	556,553	.....
Exports of scrap (gross tons)[p]	.....	194,600	170,486	1,651,618	.....
British Production:					
British pig iron production (gross tons)[r]	650,800	635,800	529,600	4,793,300	5,696,800
British steel ingot production (gross tons)[r]	1,027,000	872,700	855,900	7,220,300	8,618,000
Non-Ferrous Metals:					
Lead production (net tons)[s]	32,982	33,542	34,998	296,757	330,115
Lead shipments (net tons)[s]	50,685	46,388	37,615	305,817	350,546
Zinc production (net tons)[t]	42,283	43,614	36,221	316,764	395,182
Zinc shipments (net tons)[t]	51,847	46,085	42,351	328,453	392,310
Deliveries of tin (gross tons)[v]	6,200	5,385	5,360	44,360	55,725

†Three months' average.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corp.; [i] United States Engineer, Pittsburgh; [k] When preliminary, from Automobile Manufacturers Association — Final figures from Bureau of Census; [l] F. W. Dodge Corp.; [m] *Railway Age*; [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Z inc Institute, Inc.; [v] New York Commodities Exchange.

Weekly Index of Rate Activity in Capital Goods, Adjusted for Seasonal Variation, 1925-27 Average = 100

THE IRON AGE Weekly Index Numbers of Capital Goods Activity

(1925-'27 Average = 100)

Last week	83.6	Same week 1933	46.7
Preceding week	81.3	Same week 1932	33.2
Same week last month	77.6	Same week 1931	49.8
Same week 1935	66.0	Same week 1930	74.0
Same week 1934	41.4	Same week 1929	115.1

THE general level of heavy industrial operations moved up last week, according to THE IRON AGE's seasonally adjusted index. The index rose from 81.3 to 83.6 per cent of the 1925-27 average or "normal," a gain of 2.6 points for the week. Gains were recorded by three separate series of the combined index, whereas in two industries there were declines after seasonal adjustment. The largest advance was recorded by the index of automobile production, but railroad movement of lumber also rose, as did the index of industrial activity in the important Pittsburgh district. The index of country-wide steel mill operations declined for the week a bit more than normally, and after seasonal correction contributed a moderate loss to the aggregate level of activity. The heavy engineering construction factor continued to slump.

The gains recorded were greater than the losses both numerically and in extent, thus causing the combined index to rise. Its present level is approximately 27 per cent greater than it was at this time last year.

*Revised.

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Ward's Reports, Inc.; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

First World's Fair Contract Awarded

THE first contract starting actual construction of the New York World's Fair of 1939 was signed on Oct. 21 in the office of Grover Whalen, president of the Fair Corp., at the Empire State Building. Under the terms of the contract the Fair employs a group of seven architects, who have pooled their talents and experiences, to design the $900,000 administration building, first to be erected on the Fushing meadow site in Queens.

The directors of the 1939 Fair give the document double significance since they believe it will result indirectly in determining the type of architecture that will dominate the exposition and thus influence world design. Construction is due to start late in December, with completion scheduled for August, 1938. The structure will occupy 57,000 sq. ft. of ground and will be two stories in height.

The exterior facades are to be done in stucco, the interior of sheet rock. The frame will be of steel columns and girders. Wood pilings with reinforced concrete pile caps and ties will serve as foundation. The roof is to be "blocked to pitch" and covered with built-up roofing. The building will be heated by a hot water system and be air conditioned throughout.

WASHINGTON. . . . . .

o o o

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

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. . . Steel basing point bill will come up again in next session of Congress with Senator Wheeler as its sponsor.

o o o

. . . Donald Richberg, former general counsel of NRA, sends up "trial balloon" in favor of a modified NRA.

o o o

. . . Railroads ask Interstate Commerce Commission for new rates Jan. 1 to be above old tariffs but below emergency charges.

WASHINGTON, Oct. 27. — The Wheeler - Utterback anti-basing point bill will bob up again at the next session of Congress, according to apparently reliable reports. The object of one month's hearings at the last session, it was stymied, f.o.b., Senate Committee on Interstate Commerce. While it was not brought to a committee vote, a poll indicated that had that been done, a majority of the committee would have opposed a favorable report. It was also indicated that it would have been defeated in the Senate, though that is far from certain. On the House side the measure lay dormant before the Committee on Judiciary awaiting action or non-action at the other end of the capitol, but it is reported that the House committee majority also was opposed to the bill while House sentiment was not sounded.

But the matter of either committee or Congressional sentiment would have been altogether unimportant had the President urged passage of the bill. With an overwhelming majority back of him in both branches of Congress, he had only to demand. As it happens, the President did not publicly take a stand on the measure, hence there was no showdown on it. Nevertheless, it was the supposition that had Congress passed the measure it would have met with his approval. This is based on its sponsorship.

While introduced jointly by Senator Burton K. Wheeler, Montana, and Representative Utterback, Iowa, and vigorously supported by the former, its actual origin was the Federal Trade Commission, ardent opponent of the basing point practice in steel and other industries. Passage of the bill was strongly advocated by Commissioner Davis in testimony before the Senate committee, testimony supported by a volume of material supplied by a staff from the commission which was constantly present at the hearings to lend a hand. It is not probable that such activity would have been exercised by the commission if the President were opposed to the bill. Moreover, Senator Wheeler is rated as being close to the White House. He has accompanied the President on some of the latter's tours in the present campaign and it is doubted that Senator Wheeler, as chairman of the Senate Committee on Interstate Commerce, would push legislation of such far-reaching character as the anti-basing point bill if it had Presidential opposition. Conceivably he might do so, but is is questionable.

Will Introduce Bill Again

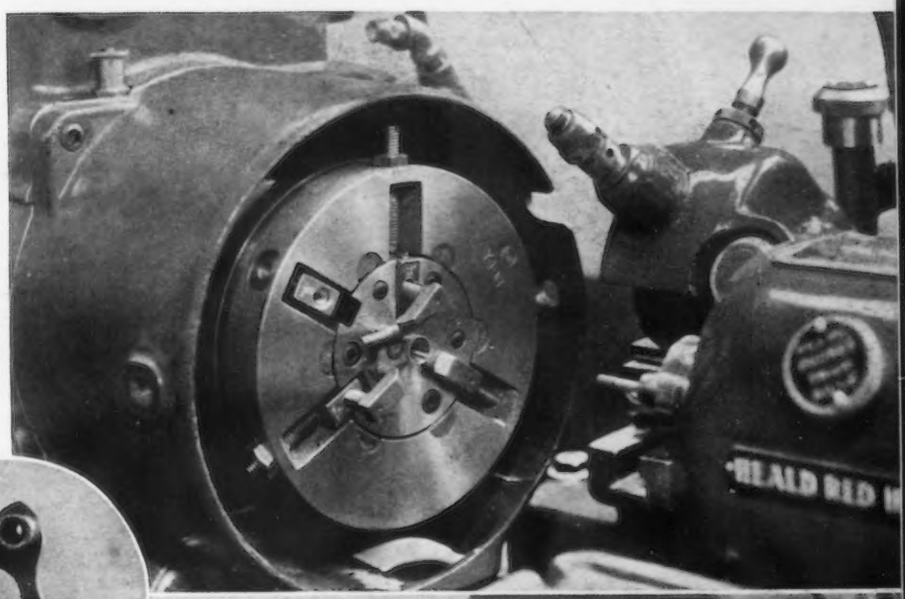
In any event it is understood that the Senator will bring the bill up again at the next session of Congress of which he definitely will be a member, inasmuch as his term has not expired, and it is taken as a matter of course that he will again be chairman of the Senate Committee on Interstate Commerce, whatever other changes may be made in its personnel as a result of the election or otherwise. One change at least is certain—a successor to the late Senator Couzens of Michigan will have to be named. The Senator was defeated in the recent Republican primaries. His attitude toward the anti-basing point bill was not clearly revealed.

The legislation has not been considered as a partisan measure; nevertheless the outcome of the pending elections may have an important bearing on its course. This because of the lively issue of regimentation. Based on its past record and present signs, the New Deal and regimentation are associated definitely together—though business groups themselves are largely responsible for much of it—and the Republican leadership has stiffly gone on record in opposition to regimentation and is vigorously trying to "smoke out" the President as to his attitude toward revival of NRA or a substitute, and further regimentation generally. Hence regimentation may be said to be a distinctly partisan issue. Regardless of his campaign talk in favor of "free enterprise," there is widespread fear in industry that if reelected the President will head again for regimentation, perhaps disguised under euphonious terms. This is not to say anti-basing point legislation would be included in such a program, but it certainly could be fitted into it.

Whatever realinement in Con-

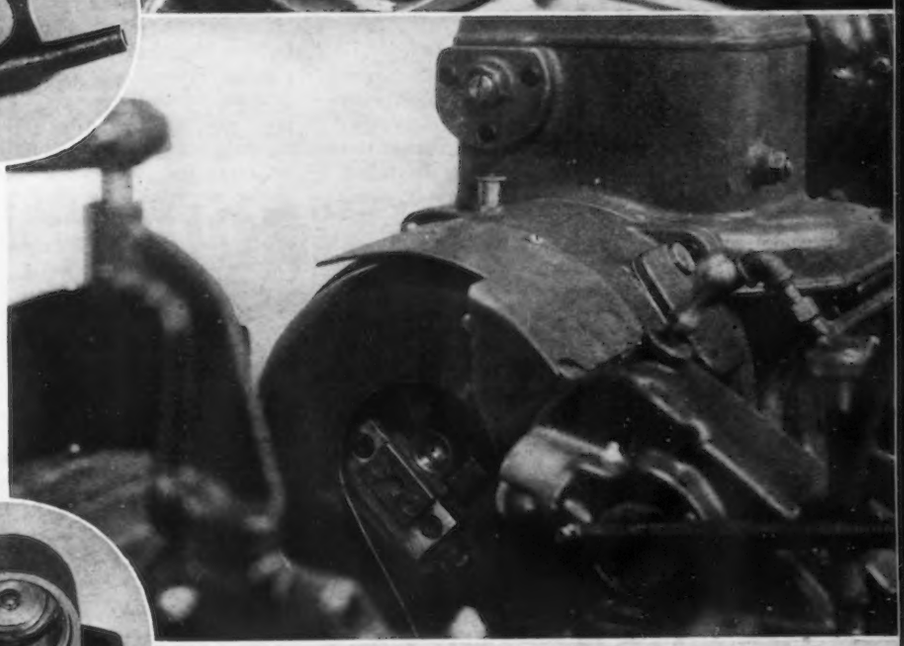
Heald No. 81 INTERNAL GRINDER

e Heald No. 81 Internal Grinder a small, automatic, extremely t machine especially designed for inding small and medium size les. Its all around versatility is own in the opposite typical in-allations. If you have a similar job, us submit recommendations.



TRAIGHT OR APER HOLES

esides grinding straight les, the No. 81 can be ickly adjusted for grinding per holes. This installation ows the grinding of a 19° taper le in a sewing machine part on e No. 81 Internal with automatic zing.



LIND HOLES

inding the straight, blind re in a universal joint unnion bearing on a eald No. 81 Size-Matic. he hole is held within .001 moving .020 stock.

ACING

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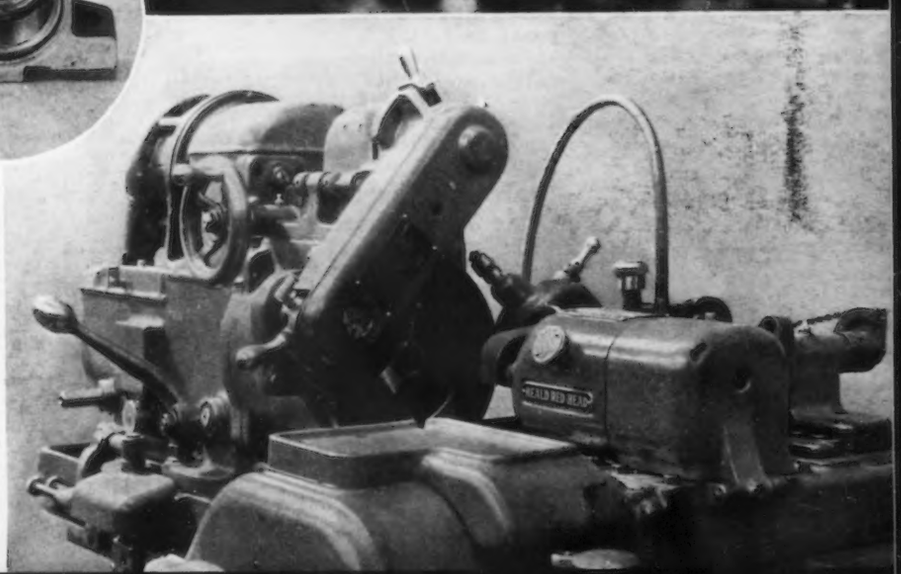


THE Heald MACHINE COMPANY Worcester, Mass.

gress may result from the elections next Tuesday, it is a foregone conclusion that the Senate will remain New Deal and there will have to be a big upset to overcome the New Deal majority in the House. If the President should be reelected by a large majority, it is expected that he will move further to the left. Some old line Democrats share the view that in such an event he will discard even the semblance of loyalty to the Democratic party and organize a Farmer-Labor party instead, or some other hyphenated political set-up.

There are a number of reasons for believing that the President has in mind the matter of further regimentation to rebuild on foundations so largely destroyed by the Supreme Court. An outstanding reason is the failure of the President to say whether he will advocate regimentation if reelected. So far he has passed on the question in terms that are nebulous only. His son, James, appears to have spilled the beans —try to cover up as he will. The indiscreet offspring has said his father would urge a constitutional amendment in order to resurrect an NRA. Madam Perkins has said the principles of NRA must be preserved, and the organized labor groups which are so actively campaigning for the President say they will demand a new NRA and other legislation which it wants.

Richberg Favors New Legislation

And now comes Donald Richberg, once a leading favorite in the charmed circle of the New Deal, former general counsel of NRA, once its temporary administrator, once "assistant president" and still a prominent New Dealer. A lively critic of the Supreme Court, he fared badly when his beloved Blue Eagle was given a fatal blow of the constitutional axe. As if this crushing defeat was not enough, Mr. Richberg was tumbled further by his erstwhile crony, General Hugh S. Johnson, who said Mr. Richberg bungled the case. The salty general thought and still thinks, it is assumed, that his pet bird could have been saved if the right plea had been made for its life, not realizing apparently that it really was a dead buzzard before it was haled before the "horse and buggy" court.

But love for the old bird and regimentation generally still abides in the breasts of New Dealers, as is evidenced further by the fact that Mr. Richberg is already engaged in drafting legislation to this end. He made this fact known in a recent address at Cleveland before the American Trade Association Executives convention. Of course, he did not say he was doing so with White House approval, but to put it negatively, it is strongly suspected he is not doing so with the disapproval of the White House which, it is also strongly suspected, is aware of his activities. The New Deal expresses great confidence that it is going to be kept in power. So on that basis it may be argued that drafting of legislation at this time for the next session of Congress by the New Deal is not presumptuous, or since its outline was divulged in advance by Mr. Richberg, it may be it was made known as another of those political trial balloons, so many of which have been punctured in their incipient rise. In that case the practice is to disclaim the balloon as of New Deal manufacture. On the other hand, ownership quickly is seized if the ascent reaches the welkin and makes it ring, or if obsessions of planned economists over-stimulate their imagination into thinking they hear the tones of the vaulted heavens . . . it is reported his proposal was given a "good hand." So was the NRA when it was in its Messianic stages. The fear is that like NRA itself the Richberg plan would grow inevitably into regimentation and further bureaucracy. Agreeable words to offset apprehension in this direction by no means comport with precedent, for precedent is that once the Government grasps power it not only holds it but adds to it, unless relief comes via a merciful Supreme Court.

A Modified NRA

Mr. Richberg took pains, and with good reason, to point out that he was not recommending either revival or renewal of NRA "as such," though the plan smacks of an NRA in false whiskers and vocalized with honeyed words. He explained and there is widespread agreement with him that the principles and ideals of the original conception of NRA were sound. That is, there is general agreement with the view if it accepts those principles as being simple and confined to fixing of decent hours, wages and conditions of work with simple trade practice rules—as contrasted with the grotesque, imponderable mess hatched by the Blue Eagle, or wished on the old bird against its will. Mr. Richberg said NRA was badly administered, which perhaps was by way of retort to General Johnson's fling that Mr. Richberg handled the Blue Eagle court case badly. Too much was attempted, said Mr. Richberg, under NRA.

The underlying principle of the legislation Mr. Richberg said he has in mind is to "coordinate and regulate," a sort of welding together of somewhat disconnected laws, such as the anti-trust acts. The plan appears to be to rewrite the "substantive" laws and set up a "coordinated" law stating definitely what does and what does not constitute a fair trade practice. Two administrative agencies would be established. The first would be

You'll never know a **HERCULES** *until you've tried one*

Few HERCULES Portable Tools have ever been sold on advertising claims alone. And that is good! In fact, it is the real reason why so many Hercules Tools have been sold the world over. Shop tests—on the actual job intended —have proven to prospective users the genuine worth of these *production* tools.

You may never know a HERCULES —just because you have never tried one. But try one or more—put them to the test—you be the judge—and we'll bank on your business thereafter.

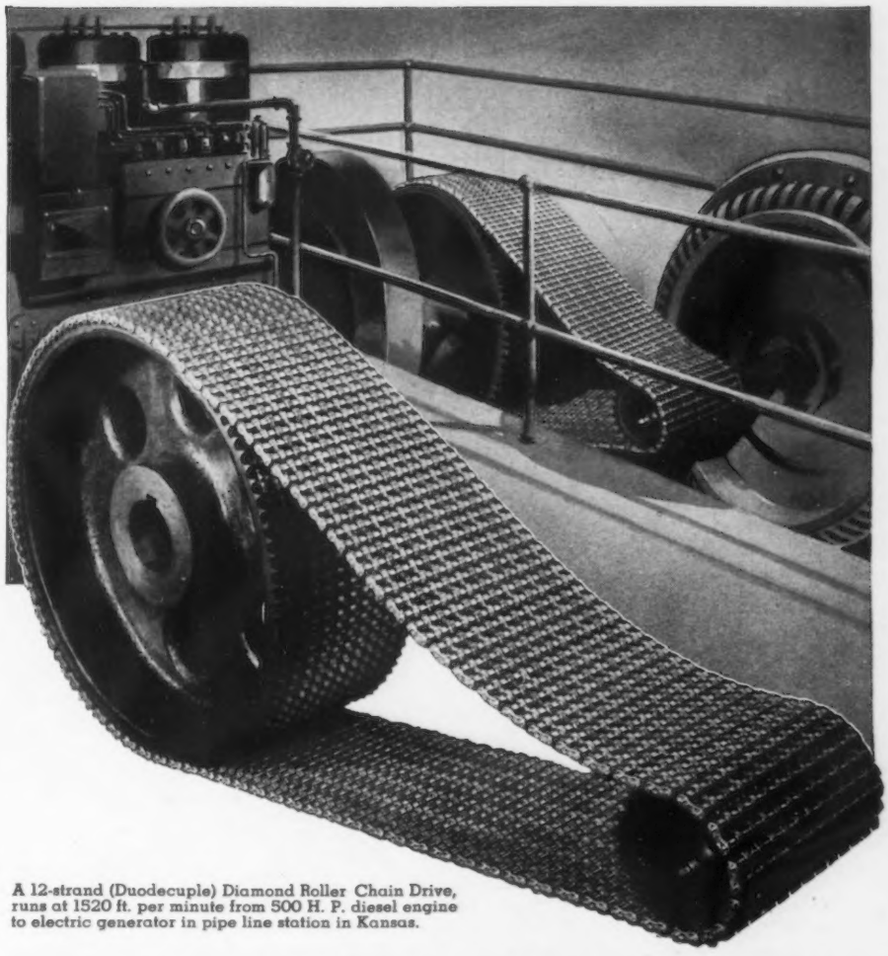
A complete line of High Freq. Electric and Pneumatic portable tools. Engineering counsel on request. Write for literature.

THE BUCKEYE PORTABLE TOOL CO. DAYTON, OHIO — HERCULES

a major enforcing agency—what one it would be was not stated. It would strictly enforce the law against illegal practices, such as those included in Group I of the Federal Trade Commission trade agreements. The second agency would be given authority to receive, review and give tentative approval to industry agreements that might be in the "twilight zone" between legality and illegality. By trial and error tests would be made of the agreements to lift from industry's shoulders the stigma of criminal prosecution. If it were found that agreements were made in good faith a polite bow would be made to the affected industries and they would be excused. As proposed, it was the view that no constitutional amendment would be required. Nevertheless, the impression was gathered that such an amendment is in the "background"—a decidedly significant implication which goes along with the statement of James Roosevelt. One difficulty pointed out is that of getting the "minority" to fall into line. The "minority" always is that group which does not agree with one's own ideas. It's a safe bet there is an even greater difficulty, that is popular opinion, and even the late supine Congress developed growing resentment toward regimentation.

What the new Congress may think about it remains to be seen if it is called upon to wrestle with the problem. The probability is that it will be, for in the absence of specific denial it is the commonly accepted view that if re-elected the New Deal will enter upon another regimentation rampage. The idea has not been dissipated in the least by generalizations expressing belief in "private business, private property and private profit" and "free enterprise" and whatnot.

Another activity under the New Deal which is difficult to reconcile with the present-day campaign emphasis in its advocacy of "free enterprise" concerns the work of Major George L. Berry's Council for Industrial Progress. The major has been turning out so-called statistical studies on numerous industries, including the distorted hodge podge on what it called the steel industry. These studies avowedly look toward "remedial legislation" to reestablish an NRA or a substitute and the major recently announced that the Council will meet in Washington on Dec. 6 to see what it can do about the Supreme Court decision in the Schechter case. Apparently the idea is to draft legislation, if possible, to circumvent the decision, which may or may not fit in with the Richberg plan.



A 12-strand (Duodecuple) Diamond Roller Chain Drive, runs at 1520 ft. per minute from 500 H. P. diesel engine to electric generator in pipe line station in Kansas.

THIS DUODECUPLE DRIVE PERMITS NO SLIPPING

● This 12-strand Diamond Roller Chain transmits power from diesel engine to generator at practically 100% efficiency—without slipping losses or voltage fluctuations, and running at linear speed of 1520 ft. per min.

This same high power-transmitting efficiency and the non-slipping advantage of Diamond Drives are responsible for their constantly increasing application in manufacturing plants. By preventing gradual loss of speed of the driven machines Diamond Drives keep production output up to maximum.

By increasing the number of Diamond Drive-equipped motors in your plant—you get extra production at lower cost . . . Our engineers will make recommendations, and distributors in 45 cities are stocked to furnish the Diamond Drives you require—in single or multiple strand belts. DIAMOND CHAIN & MFG. CO., 433 Kentucky Ave., Indianapolis, Ind. *Offices and Distributors in Principal Cities.*

7½ horse power high speed electric motor drive.

DIAMOND CHAIN DRIVES

Railroads Propose New Rates, Below Present Emergency Tariffs

WASHINGTON, Oct. 27.—Schedules proposing a readjustment of the rate structure to take effect after the expiration on Dec. 31 of the present emergency charges were filed with the Interstate Commerce Commission by the railroads last Thursday. Details of revised rates on iron and steel products and their raw materials were published in THE IRON AGE of Oct. 15, page 229.

The petition, it was pointed out, does not ask the commission to approve the proposed changes in the rate structure, however, but merely asks that the outstanding orders of the commission be modified to give the railroads an opportunity to bring the suggested revisions to its consideration. The proposed structure, the petition stated, would bring rail charges to a somewhat lower level than those now in effect.

The proposal calls for an increase, after elimination of surcharges, in the iron and steel commodity rates of 10 per cent with a maximum of 1c. per 100 lb., or 20c. per net or gross ton, as rated. Iron and steel column rates would be increased 1c. per 100 lb. The resulting rates, it has been stated, would be somewhat less than those now prevailing.

The petition said the railroads are confronted with a situation which demands that they take immediate steps to prevent a substantial decrease in their revenues. Emergency charges during the first eight months of 1936 produced $77,000,000. It was stated that without the emergency charges, in the absence of further order by the commission, Class I railroads would have failed to earn by approximately $60,600,000 their fixed charges. It has been estimated that the proposed new rates would raise $50,000,000 or about one-half of the sum raised by the emergency charges. Even with the proposed rates, the petition said, the railroads will still be in dire need of additional revenues which are to be obtained, if at all, only on the event of a very substantial increase in the present volume of traffic. It was pointed out that the unit costs of railroad labor are now the same as at the time the commission authorized the emergency charges and that the unit prices of materials and supplies are slightly higher. The increased operating costs, due to these increased unit costs and prices, on the basis of 1936 business, according to the petition, will be more than $300,000,000.

Waiving arguments for or against the proposed readjustment of the freight rate structure, the commission will take it up for consideration immediately after Nov. 7, the date on which all replies to the railroads' petition must be filed. The early date for consideration indicates that the commission intends to give quick consideration to the request of the railroads and its action in temporarily setting aside more than 1000 past freight rate decisions in response to a plea of the carriers denoted a favorable commission attitude toward general readjustment of the freight rate structure. This move was announced last Friday, the day after the filing of the carriers' petition. While manifestly, in setting aside the past decisions, the commission took no position with respect to the proposed rate changes it had the effect of removing the one legal obstacle that stood in the way of considering the rate readjustment plan and of denoting that the argument of the carriers for need of additional revenues deserves deliberation.

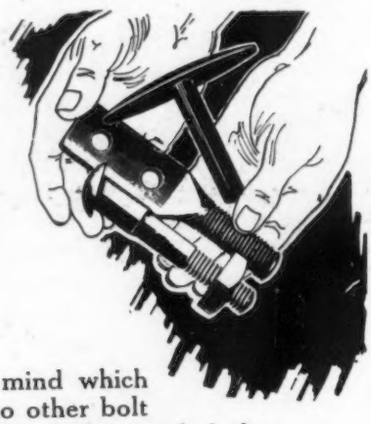
Steel Recovery Most Marked in Britain

LONDON *(Special Correspondence)*—An interesting speech on the recovery of the British steel industry was made by Sir Walter Benton Jones at the annual meeting of the United Steel Companies, the great British combine. He pointed out that the recovery in the steel industry had been worldwide, but was most marked in the United Kingdom.

Already production is approaching the level reached in 1929, and Sir Walter said that if it were assumed that production in the current year would be exactly twice what it was in the first six months, Britain would have passed the 1929 level by 19 per cent. Thus she would continue to lead in the recovery, for western Europe would be 13 per cent below the 1929 level, and the United States 24 per cent below.

On this question Sir Walter said that while the export trade with Empire countries continued to show progressive expansion, there was no improvement in sales to foreign countries. But he went on to express the hope that the efforts now being made toward currency stabilization might prove to be the beginning of better times in the export market.

Have You a Special Bolt You Want Made?



Possibly you have something in mind which you feel must be forged—which no other bolt maker can produce as he does his regular stock bolts. If so send us the sample or specifications. Of course our regular stock line of Bolts, Nuts and Screws is complete.

SPECIFY CLARK'S

CLARK BROS BOLT CO.

Clark Street, Milldale, Conn.

..PERSONALS..

THOR M. OLSON has been appointed sales manager of the Ex-Cell-O Aircraft & Tool Corp., Detroit, succeeding William F. Wise, who resigned on Sept. 15 to become president of Republic Products Corp. Mr. Olson held the position of general manager at the

T. M. OLSON

Continental Tool Works from the time it was founded until shortly before the time it was acquired by Ex-Cell-O in 1930. During the latter part of this period, he was also president. After becoming associated with Ex-Cell-O, Mr. Olson became vice-president and a director, in which capacity he took an active part in sales work. He has an extended mechanical background, gained through his many manufacturing activities.

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WILLIAM C. HEATH, president of the A. C. Smith Corp., Milwaukee, has been elected a trustee of Beloit College, Beloit, Wis., of which he is a graduate.

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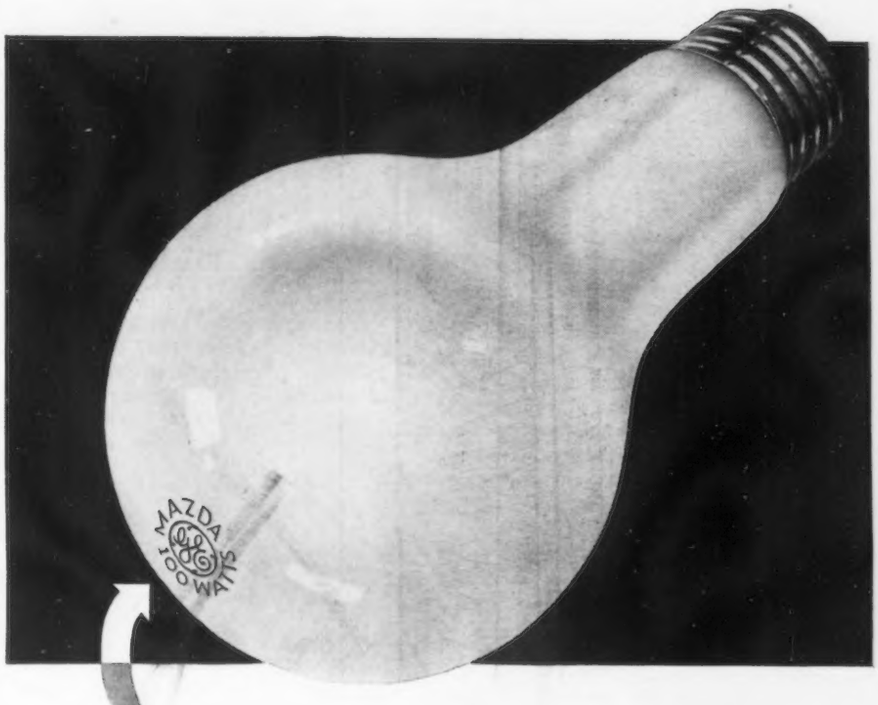
T. N. ANDERSON, formerly general manager of manufacture, general line, of the American Can Co., New York, has been elected a vice-president and comptroller. D. W. FIGGIS, heretofore assistant to the vice-president in charge of sales, has been elected vice-president in charge of sales, general line. C. G. PREIS, formerly chief engineer, has been made vice-president in charge of engineering, and G. H. KELLOGG, general manager of sales, packers' cans, has

THIS MARK GE MEANS UP TO 30% MORE LIGHT



. . . *they stay brighter longer*

YOU can't save money on light by buying inferior bulbs. "Electric Eye" tests show they waste as much as 30% of the light you pay for. Poor light handicaps your workers . . . increases errors . . . slows up production. Why take chances on bulbs that waste light when those bearing the G-E mark of quality cost so little? Next time you order bulbs, make sure they are Edison MAZDA lamps. Be sure the monogram GE is on every bulb.

USE THE G-E LIGHT METER TO MEASURE YOUR LIGHTING

The General Electric Light Meter tells whether employees are getting enough light for easy seeing, and is helpful in checking from time to time on whether this amount of light is being maintained. Costs only $11.50. For further information write to General Electric Company, Dept. 166, Nela Park, Cleveland, Ohio.

EDISON MAZDA LAMPS

GENERAL GE ELECTRIC

become vice-president in charge of sales, packers' cans. C. H. BLACK, who has been assistant general manager of sales, general line, has been appointed general manager of sales of the same division.

❖ ❖ ❖

J. THOMAS BARCLAY has been appointed chief metallurgist, Vandergrift works, Carnegie-Illinois Steel Corp. Mr. Barclay began his service with the corporation in the Vandergrift works on Feb. 1, 1912, in the metallurgical department and advanced by promotion through various grades until he became assistant chief metallurgist on Jan. 1, 1926, which position he held until his present appointment. EDGAR MARBURG has been appointed assistant chief metallurgist. Mr. Marburg was graduated from the University of Pennsylvania in 1917. He was employed by the Aluminum Co. of America until September, 1925, when he entered the Massachusetts Institute of Technology for post graduate work. He received the degree of M.S. in 1926 and entered the employ of the Jones & Laughlin Steel Corp., where he was employed until 1928, when he went with the steel corporation in its Vandergrift works as a metallurgist, serving in that capacity to the present. SAYLOR C. SNYDER has been appointed chief inspector. Mr. Snyder was graduated from Pennsylvania State College as an electrical engineer. He was employed by the Pittsburgh Electric

J. T. BARCLAY

Furnace Corp. as assistant electrical engineer from 1927 to Sept. 1, 1928, when he entered the employ of the corporation in its Vandergrift works, where he has been connected with production of electrical sheets.

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FRANK H. PRESCOTT will relinquish his duties as general manager of the Delco Products division of General Motors Corp., Dayton, Ohio, on Nov. 1. He has been elected a vice-president of Electro-Motive Corp., LaGrange, Ill., and will become general manager of that General Motors division on the same date.

CARL H. KINDL, now factory manager of the Delco Products division of General Motors Corp., will become general manager of

F. H. PRESCOTT

C. H. KINDL

that division on Nov. 1, succeeding Frank H. Prescott. Mr. Kindl was graduated from Carnegie Institute of Technology in 1917, becoming a member of the starting, lighting and ignition section of the Westinghouse Electric & Mfg. Co. In 1925, Mr. Kindl went to the Delco-Remy division of General Motors at Anderson, Ind., as a member of the ignition engineering staff. A year later he was transferred to the Delco Products division as carburetor engineer. In 1929, he was promoted to chief engineer and in January of this year he was made factory manager.

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WOODS SANFORD has resigned as advertising manager of the Harnischfeger Corp., Milwaukee, to join the sales staff of the Chain Belt Co., Milwaukee. He is succeeded by EDWARD SLACKFORD, for 10 years engaged in industrial advertising in both manufacturing and agency work. Mr. Slackford

EXPERIENCE makes SPRINGS

Send your "Springquiries" to

Quality Springs since 1845

DUNBAR BROS. CO.
BRISTOL CONNECTICUT

at one time was connected with the Marion Steam Shovel Co. of Ohio.

❖ ❖ ❖

S. R. THOMAS, for the past four years with the Cord automotive interests, as chief engineer of Auburn, Cord and Duesenberg, has been appointed manager of the

S. R. THOMAS

automotive bearing division of the Bantam Ball Bearing Co., South Bend, Ind. Previous to his Cord affiliation, he had been associated with General Motors Corp. He has been identified with the automotive industry for the past 22 years.

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R. E. STONE has been named vice-president in charge of manufacturing of the Graham-Paige Motors Corp., Detroit. During the past five years Mr. Stone has been

R. E. STONE

acting as general assistant to JOSEPH B. GRAHAM during the time the company was concentrating its manufacturing facilities in Detroit in place of operating five widely separated plants. Mr. Stone entered the automobile industry in 1915 with Dodge Brothers, later becoming treasurer and assistant general manager of Dodge Brothers of Canada, Ltd., at Toronto. When the Dillon Read Co. bought out the Dodge heirs, Mr. Stone was sent to Detroit and commissioned to institute departmental operating controls in all Dodge plants. Leaving Dodge shortly before it was purchased by the Chrysler Corp., Mr. Stone joined Graham-Paige, which at the time was in the midst of a rapid expansion. He built the Graham body plant at Evansville, Ind., and subsequently managed it for more than two years. This is one of the plants that has recently been disposed of, as well as the body plant at Wayne, Mich., a lumber plant at Perry, Fla., and a service and export plant on Fort Street, Detroit.

(CONTINUED ON PAGE 64)

HE WANTED IMPROVEMENT

THE inclinator step illustrated is of pressed steel 1/8" thick; 15" x 15 1/2" x 3 3/8" high. The welded end lugs provide the necessary strength, at less cost than is feasible by any other method.

This is typical of what Parish engineers are able to accomplish, by a skillful combination of stamping and welding, to provide better parts of improved appearance and lowered final cost.

Whether the stamping be simple or complicated, large or small, complete as it comes from the press or involving building up thru other operations, we welcome the opportunity to discuss the problem with you.

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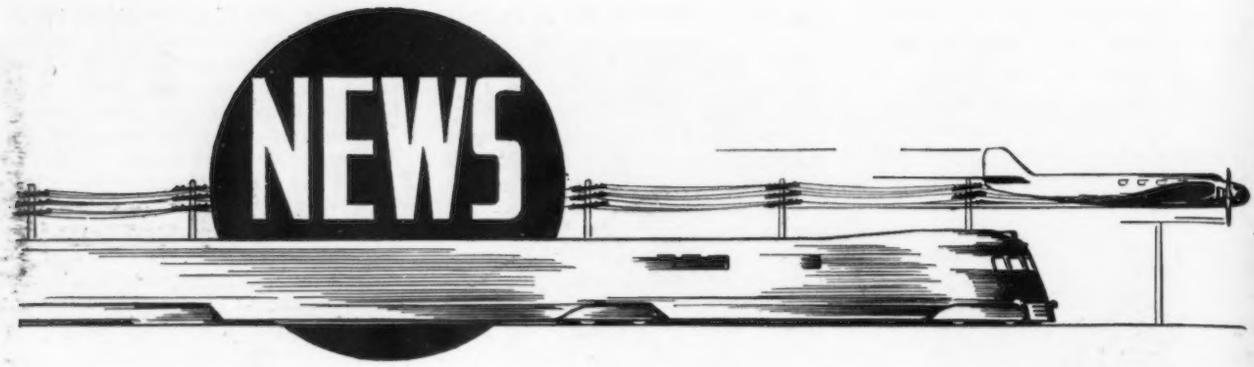
Pacific Coast Rep.: F. Somers Peterson Co., 57 California St., San Francisco, Cal.



Steel Construction Institute Holds 14th Annual Convention

THE American Institute of Steel Construction held its 14th annual convention at Hotel Greenbrier, White Sulphur Springs, W. Va., on Wednesday, Thursday and Friday of last week. Representatives from some 200 leading structural fabricating concerns throughout the country attended the sessions.

As has been the custom at these meetings, considerable attention was given to the future outlook. This year, aside from political considerations, the prospects for the fabricating industry appeared to be bright, particularly for the long term. Opportunities for the industry present themselves not only because of the great accumulation of unfilled needs over the past five years, during which demands have averaged about one-third of normal but also because of new needs occasioned by city planning, by the replacement of hazardous bridges and by the speeding up of the elimination of grade crossings.

Clyde G. Conley, president of the Mt. Vernon Bridge Co., Mt. Vernon, Ohio, and president of the Institute, reviewed the work of the association and the progress of the industry during the past year.

"I do not believe," said Mr. Conley, "that either the public or our industry itself realizes how much the public receives for the money paid to our industry, for the steel in a building completely erected, if a simple building, will cost as little as four cents a pound. The steel in a bridge over a navigable stream, with all the hazards of erection, will cost the buyer as much as seven cents a pound. These two figures represent the extremes although, of course, there are unusual instances of very costly work or very cheap work, which will not be included.

"For this, the public receives a high grade of structural steel plates, shapes and bars, which we buy from the mills at an average of more than two cents a pound, including extras. For the difference, or from 2c. to 5c., we pay freight and delivery charges, which may run more than a cent a pound, make the detailed drawings, fabricate, erect, rivet and paint it, including all the hazards of erection.

"The highly technical service which we are able to give is certainly a very valuable commodity."

In describing the needs of the industry, president Conley emphasized the importance of public relations and particularly of those having to do with legislative matters. The tax on undistributed earnings, he declared, will be a serious matter in particular for the fabricating industry, which must depend upon the alternation of fat and lean years and not upon steady volume.

Money Plentiful, Men Scarce

V. G. Iden, secretary of the Institute, who followed Mr. Conley, declared that the depression had spent itself and that the heavy industries were showing a definite recovery.

If this continues, it is his opinion that the industry may encounter an employment situation similar to that in 1929.

Said Mr. Iden: "Surveys show that in 1929 the number of people gainfully employed in the United

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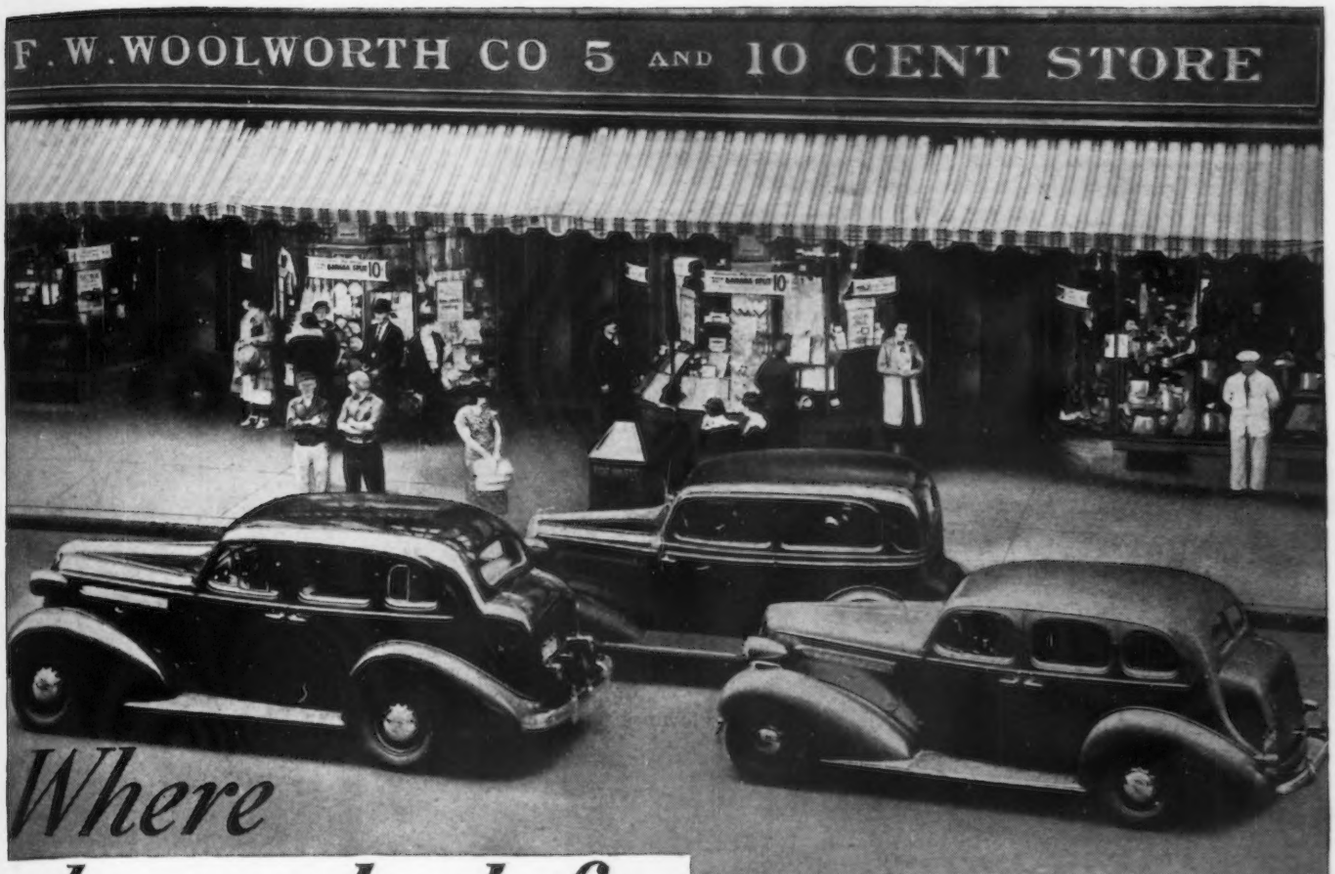


Where do you look for Constant, Dependable Tonnage?

Where do you look for that constant, *dependable* tonnage needed for your rolling mills?

Do you look to that market limited to those relatively few fabricators who are equipped to handle extreme widths?

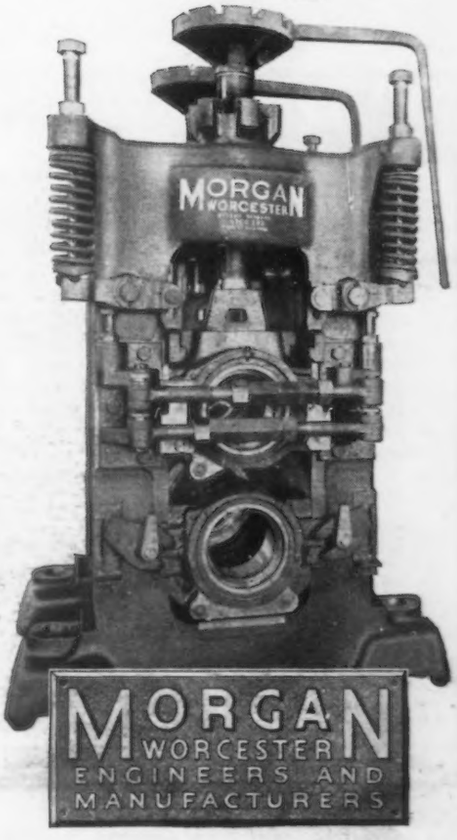
Or do you look to that vast market which is producing millions and millions of commonplace articles, used by rich and poor alike?

Wander through the "Five an' Ten"; figure the length of wire in a window screen; examine the housewares in your kitchen—and think of the market that lies *ahead* of your rod, strip and merchant shapes!

This market also demands top quality, *for its costs must be figured in fractions.* And these costs are influenced by the quality of material supplied for each process.

Rolling mills equipped to supply rod, strip and merchant shapes rolled to closer tolerances, with finer surfaces, greater uniformity in structure, will find plenty of profitable tonnage. And it can be done.

Details govern accuracy. Modern Morgan Continuous Rolling Mills show the results of constant research, years of experience, sound engineering—for no detail is too small to be left alone. You can depend upon a new Morgan Mill to produce the specified tonnage, the desired accuracy, the lowest cost.



R11

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS · U.S.A.

States amounted to 47,000,000. Today there are 46,500,000 gainfully employed. Those figures include the 3,000,000 on emergency Government work. Also, they do not take into account the 2,000,000 of young persons who have, since the beginning of the depression, grown to an age when they would normally seek employment.

"The figures do show, however, that if we could tomorrow find jobs for from two to three million persons we would have on our hands an employment situation similar to that which existed back in 1929 when business was booming. The goal is not unreasonable. It can be attained, with a little effort."

Speaking of America's financial ability to carry out a volume of business comparable with 1929, Mr. Iden said:

"The boom that culminated in 1929 was financed on time and demand deposits of about fifty-three billion dollars. Similar deposits today aggregate about fifty billion dollars. Even taking into account the increased reserve requirements, taking into account the probable demand upon our deposits because of the recent deflation of foreign currencies, we have in hand adequate bank deposits for a very much larger volume of business than we had even in 1929."

Four guest speakers addressed the members of the Institute on Wednesday afternoon.

John H. Van Deventer, editor of THE IRON AGE, presented a new geometrical method for appraising competition and determining the "supremacy areas" in which sales resistance is reduced to its minimum.

Walter S. Tower, executive secretary of the American Iron and Steel Institute presented a paper entitled "The Mill and the Fabricator," which, in his absence was read by R. B. Thomas, general counsel of the Institute. Mr. Tower dealt with the reciprocal relations existing between mills and fabricators of steel both in the fields of production and merchandising.

"When one paues to consider," said Mr. Tower, "that mill and fabricator together have made the skyscraper possible, have built bridges the like of which exist nowhere else in the world, are working to solve the tangled problems of ways for land transport, and are daily adding to the nation of steel in which we live, it is easy to find reasons for faith in their continued accomplishment."

Holden Sees a Bright Outlook

Thomas S. Holden, vice-president, F. W. Dodge Corp., New York, addressed the assembly on the subject of "The Building Outlook." Urban centers, declared Mr. Holden, have held their own with non-urban localities in construction contracts during the past three years. Of the urban type of buildings customarily built by private enterprise, apartment houses constitute the one important class that thus far has had any important increase. New apartment house construction, according to Mr. Holden, is distinctly on the up-grade. New city hotels and theaters are apt to come back rather slowly. While there is still considerable untenancy in office and other urban rented structures, a large volume of alteration work is being carried on for modernization purposes. Aside from the urban situation, Mr. Holden declared that there was bright outlook for construction activities in the fields of highway bridges and factory construction. Bridge contracts have doubled in the 27 Eastern states this year as compared with last. New factory construction was greater, during the first nine months of this year than in any of the three preceding years.

City planning, according to Mr. Holden, offers great promise for the construction industry and it will be accelerated by the public demand for convenience and attractiveness in living quarters.

A. P. Greensfelder, president of the Fruin-Colnon Contracting Co. of St. Louis, presented a paper entitled "Let's Rebuild America." In his absence, this was read to the members by Henry Pann, Chicago district engineer of the Institute.

"Naturally, the first question which arises," said Mr. Greensfelder, "is—Does America need rebuilding? I reply, "America will always need rebuilding." It is not finished now and there is no reason why it should ever be. It now needs, and will constantly need rebuilding. As soon as man finishes a structure it begins to depreciate. This depreciation is caused not only by the natural elements but by lack of maintenance, change of use, migration of industry, destruction by fire and obsolescence. I should like very much to add *styling* as one of the major causes of this devalution of America's structural plants. Unfortunately, the construction industry, by and large, is not style conscious."

Finding the "Forgotten Bridges"

At the Thursday morning session, following a report by F. H. Frankland, chief engineer of the Institute, an address was made by J. R. Burkey, chief engineer of bridges of the State of Ohio. This was on the subject of "Forgotten Bridges." Mr. Burkey cited the rather astonishing revelations made as to the status of bridges in his state by a complete inspection of every structure.

"Analyzing these records," said the speaker, "we are brought face to face with the inadequacy of a large number of our highway structures. On the present state highway system of Ohio there are

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about 1850 bridges that are weak and narrow or both, to such an extent as to constitute serious hazards on our highways. We know where each such bridge is located and approximately what it would cost to recondition it or replace it, but the revenues that are available for this purpose (and I presume a similar situation exists in most other states) are entirely inadequate to do the work that should be done to safeguard the traveling public and to give it the service to which it is entitled as measured by the motor vehicle revenues that are paid in."

A golf tournament was held on Thursday afternoon, followed by the annual banquet at which addresses were made by Glenn Griswold, editor of *Business Week* and by Frank Lovejoy, sales-executive of Socony-Vacuum Co., Inc., New York.

On Friday morning reports were read by T. H. Hendrix, director of statistics of the Institute and by Robert T. Brooks, its executive vice-president. On Saturday morning, a joint session was held at Hot Springs, Va., with the Robert Morris associates.

The suggestion of the Manual Committee of the Institute to the members, made in report by chairman V. E. Ellstrom of Bethlehem Steel Co. of certain changes in specifications, was approved by the members. Chief among these is the moving up of the allowable unit stress from 18,000 to 20,000 lb. per sq. in.

One of the features of the meeting was the showing of a sound track moving picture taken during the construction of the San Francisco-Oakland Bay bridge. Preceding the showing of the film, C. F. Goodrich, chief engineer of the American Bridge Co., made a brief statement of some of the most important facts regarding this structure.

Parsons Associated With Brassert

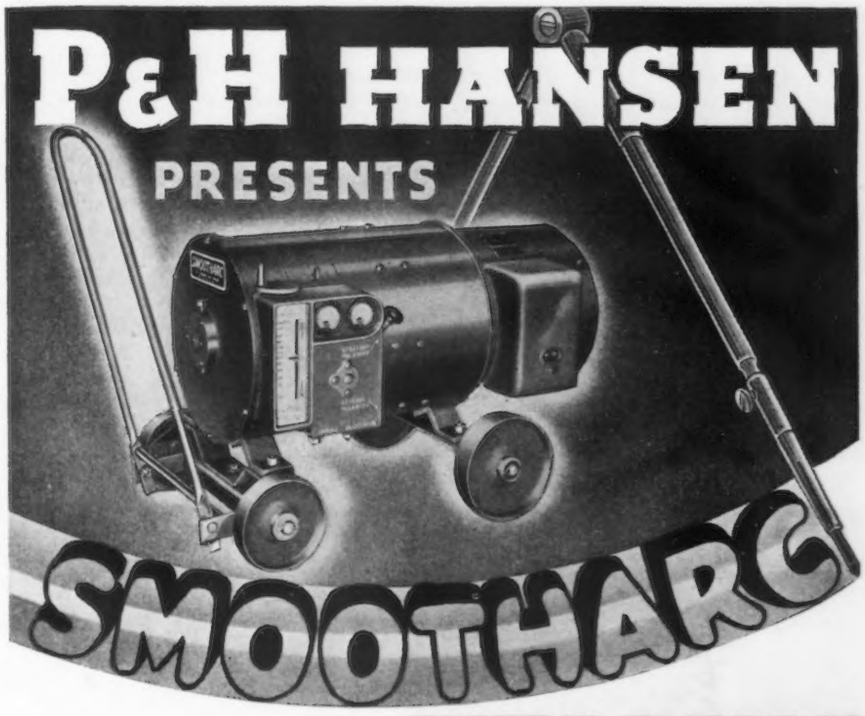
RALPH M. PARSONS CO., Chicago, refinery engineer and contractor, and H. A. Brassert & Co. of Chicago and London, consultants and contractors in the steel industry, are now associated.

The Parsons company, which specializes in the design and construction of Dubbs cracking units, built the $2,500,000 Wilshire refinery recently completed at Los Angeles, and plants for the Big West Oil Co., the Home Oil & Refining Co., and the Independent Refining Co., in Montana, as well as the Malco refinery at Artesia, N. M. Several other Parsons' jobs are now under construction in various parts of the United States and Canada.

The Brassert company has a long record in the design and construction of steel plants and steel plant equipment, including the new Corby plant in England, which is one of the largest in Europe. Brassert has world-wide contacts in the oil industry as well as in steel.

Each company will keep its own identity, management and organization, but will work together. Offices of both companies are at 310 South Michigan Avenue, Chicago.

GEHNRICH & GEHNRICH, maker of industrial ovens and sheet metal work, have moved their office and plant to their new building at 32-32 57th Street, Woodside, N. Y.



WELDING

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Smootharc welding... the perfect, complete fusion of metal to metal by uniform welding heat . . . is tangible proof of the merits of an advanced welding generator — the P&H-Hansen Smootharc Welder.

Put the Smootharc Welder to any test — in tight corners — hard-to-get-at-places — in the "pinches" — for arc stability, uniform current, penetration, metal deposit . . . and you will find a welder that measures up beyond your expectations.

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K-21

Metal Distributors Ask Stenciling Of Prime Galvanized Sheets

A RESOLUTION recommending the stenciling of each prime galvanized sheet so as to distinguish it from a second was adopted at a meeting of the National Association of Sheet Metal Distributors on Oct. 20 in Atlantic City in conjunction with the 42nd annual convention of the National Wholesale Hardware Association.

Introduced by J. F. McNeive, W. F. Potts, Son & Co., Inc., Philadelphia, the resolution brought forth lively discussion from both the distributers and the mill representatives. Mr. McNeive also said that 80 per cent of the distributers favored a continuation of the mill differentials and the mill and item extras on flat galvanized sheets.

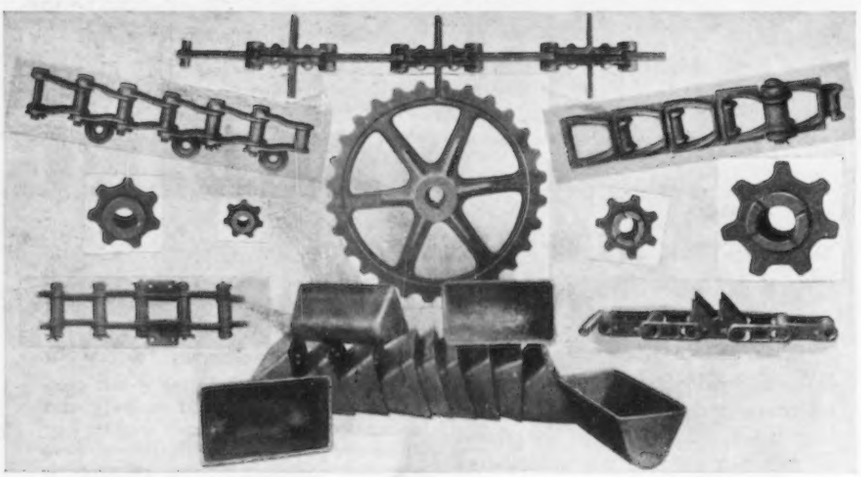
Following introductory remarks by the president of the association, A. W. Howe, J. M. & L. A. Osborne Co., Cleveland, the secretary, George A. Fernley of Philadelphia, spoke briefly, pointing out some of the services the association had rendered members throughout the year. Among these were: The issuing of bulletins explaining and clarifying the Social Security Act, Robinson - Patman Act, Walsh-Healey Act and consumer cooperatives; disposal of delinquent accounts with a high percentage of results by a credit bureau; disposal of surplus stocks as far as possible; research into the problems of management; and the publication and distribution of legal opinions on legislation of interest.

The new Federal tax on undistributed surplus was discussed from the floor and it was brought out that dividend checks must not only be in the hands of stockholders by Dec. 31, but must also have cleared the bank by that date.

The committee passed a resolution introduced by O. F. Murphy, Lyon, Conklin & Co., Inc., Baltimore, chairman of the tin and terne plate committee, recommending the continuation and increase of advertising of terne plate as a roofing material. Pointing out that the roofing business has increased 25 per cent, Mr. Murphy urged an attempt on the part of the distributers of terne plate to secure some of the business. Morris Strober, speaking from the floor, advocated a 20-lb. coating as the minimum for terne plate and expressed the opinion, which seemed general at the meeting, that the 40-lb. terne plate was about the best roofing material available. The association also passed Mr. Murphy's resolution recommending the consideration of quantity differentials to protect the terne plate distributers. A resolution was also passed affirming the present weights of terne plate coating, 8, 15, 20, 25, 32 and 40 lb., as listed by the Department of Commerce.

The nominating committee, which was to have closed the session with nominations for next year's officers, following which an election was to have been held, moved instead that the present officers remain in office until the annual meeting in Cleveland next May. This was passed.

CHAINS · WHEELS · BUCKETS



Longer life—freedom from breakdowns and lost time—complete impact and abrasion resistance—are available in Chains, Wheels and Buckets of AMSCO Manganese Steel. Detachable, Pintle, Cotterless, Hanson, "H" Class, Combination Chains, etc., with Sprocket and Traction Wheels of all sizes, and Buckets of "M. S." Standard dimensions stocked, or patterns on hand for quick production. Insure satisfactory operation of your machines—specify AMSCO Manganese Steel Chains—Wheels—Buckets!

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AMSCO

TRADE MARK REGISTERED

McKeesport to Merge National Can Co.

DIRECTORS of the McKeesport Tin Plate Co. have called a special meeting of stockholders for Nov. 24 to ratify a merger with the National Can Co. The surviving corporation will continue business with an aggregate capital and surplus in excess of $18,000,000.

The consolidated organization will keep the name of the McKeesport Tin Plate Co., but also will retain the trade name of National Can Co.

It was stated that officers and employees of the two organizations will continue in their present positions. In cases where positions are duplicated, officers and employees of National Can shall, for the present, be assistants of corresponding members of the McKeesport Tin Plate organization.

Directors of National Can Co., in which McKeesport holds a 65 per cent stock interest, recently called a meeting of their stockholders for Nov. 17 to ratify the merger.

Under the plan, outstanding certificates of McKeesport Tin Plate Co. stock will continue to evidence like interest in the merged company, and new Tin Plate certificates will be issued to existing stockholders of the National Can

Co. on a share-for-share basis. This will leave more than 200,000 shares available for issue at the discretion of the directors, out of a total authorized capitalization of 600,000 shares of no par value.

Many operating and marketing economies are confidently expected from this merger.

New Timken Sicromo Steels Announced

TO enable engineers and operators to achieve the economic balance essential to minimum production costs in refinery and other high temperature operations, the Timken Steel & Tube Co. has developed a new series of steels to be known as Sicromo 1, 2, 3 and 5.

Sicromo steels contain the 0.50 per cent molybdenum which is claimed to have been found to be most effective for increasing creep strength on an economic basis. Their high silicon content develops the desired degree of oxidation resistance, while economic resistance to corrosion is assured by the varying percentages of chromium indicated by the numbers.

Sicromo 1, 2 and 3 are recommended by the producer for use in high temperature applications where low to medium oxidation and corrosion resistance is required. Sicromo 5 is designed for use where severe corrosion and oxidation is encountered, yet where equipment cost must be held to the minimum consistent with economic life and efficient operation.

Iron Ore Mined in 1935 Gained Sharply

IRON ore mined in the United States in 1935 amounted to 30,540,252 gross tons, an increase of 24 per cent compared with 1934 and 8 per cent above the average for the preceding five years, according to the report of the United States Bureau of Mines. Iron ore was produced at 144 mines in 16 states in 1935, compared with 141 mines in 15 states in 1934.

Shipments of iron ore in 1935 amounted to 33,426,486 gross tons valued at $83,034,561, an increase of 30 per cent in quantity and of 25 per cent in total value compared with 1934. Compared with the five-year average for 1930 to 1934, the 1935 shipments showed an increase of 20 per cent. The average value per ton of iron ore at the mines in 1935 was $2.48 against $2.58 in 1934.

Baldwin-Southwark To Issue House Organ

THE Baldwin-Southwark Corp., Philadelphia, subsidiary of the Baldwin Locomotive Works, will mail early in November to about 2000 individuals in industrial plants the first issue of a new house organ, Baldwin-Southwark. The initial number is to commemorate the centenary of the Southwark division and includes historical articles covering the three divisions. The I. P. Morris division is 108 years old, while the De La Vergne division is well past the half-century mark. The magazine consists of 28 pages of text and illustrations, many of the latter from old prints.

Graham Rohrer, advertising manager of Baldwin-Southwark, is editor of the house organ. Following graduation from Harvard University in 1935, Mr. Rohrer engaged in newspaper and radio work before joining Baldwin-Southwark late last year.

Send for this book

Used as a standard reference in many technical libraries.

Lifting and carrying operations make up a great part of your production labor. When this work is made easy—when labor is removed by overhead handling—your men are not quickly fatigued, hence they produce better work at a faster pace and a lower cost.

American MonoRail equipment operates smoothly with the least effort. It is engineered and built by men who specialize in MonoRail handling problems. If you require a single track with a few trolleys or a completely automatic system, their services are available without obligation.

THE AMERICAN MONORAIL CO.

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Republic to Spend $30,000,000; Continuous Strip Mill Included

CONSTRUCTION of additional finishing facilities, with a wide continuous strip sheet mill expected to be the major item, together with the construction of additional coke ovens and the enlargement of existing blast furnaces, are proposed in a program of the Republic Steel Corp., which has under consideration expenditures in excess of $30,000,000 for these purposes.

These plans are set forth in a registration filed by the corporation with the Securities and Exchange Commission, Oct. 21, covering $25,000,000 of general mortgage 20-year bonds. Details of the construction and improvement program are not presented. The statement said that the capital expenditures will for the most part be made subsequent to Jan. 1, 1937.

According to the statement, $23,000,000 of the net proceeds from the bond issue will be deposited with the corporate trustee under the general mortgage and will be paid out from time to time to reimburse the corporation for capital expenditures made after Sept. 1, 1935.

Of the proceeds, $1,700,000 will be issued against delivery to the corporate trustee of an equal principal amount of debentures of the Truscon Steel Co., a subsidiary, which the corporation will have acquired for the purpose of providing the Truscon company with $625,000 for additional working capital and funding advances of $1,075,000 which have been made to that company.

No firm commitment to take the issue has yet been made, but it is expected that Kuhn, Loeb & Co., and Field, Glore & Co., both of New York, will be included in the underwriters it was stated.

PERSONALS

(CONTINUED FROM PAGE 57)

FRANK SCHUBERT, who for the past three years has been assistant to the president of the Bearings Co. of America, Lancaster, Pa., has become associated with the management of the Houde Engineering Corp., Buffalo. Prior to his connection with the Bearings company, he had charge as consulting engineer and works manager, of planning, equipping and operating the anti-friction bearing plant in Moscow.

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FRANK J. BOEHM, formerly identified with Steel & Tubes, Inc., Cleveland, has been appointed general sales manager of the Jackson Tube Co., Inc., Brooklyn.

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PAUL S. LANE, chief metallurgist of the American hammered piston ring division of the Koppers Co., Baltimore, has been made metallurgical research engineer. He is to present a paper at the 1937 convention of the American Foundrymen's Association entitled "Some Experiences with Wear Testing" based upon a broad experience in piston ring work.

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ROY A. KROPP has been elected president of the Kropp Forge Co., Chicago, succeeding CHARLES A. KROPP, who will continue his connection with the company as chairman of the board. Roy a Kropp represents the third generation of the Kropp family to follow the forging business.

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E. F. FEELY, representative of the International Nickel Co. in South America, and J. S. VANICK, a member of the development and research division, are visiting several South American countries within the next few months to offer consultation service to industrial executives and engineers on problems involved in the production and application of nickel alloys.

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H. W. HARMAN, for many years head of the engineering and research departments of the Stearns Magnetic Mfg. Co., Milwaukee, has been transferred to the sales department in the capacity of sales engineer with supervision of the purchasing department.

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THOMAS TOWNE, for several years connected with export sales activities in the New York office of the Union Drawn Steel Co., Massillon, Ohio, has resigned.

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C. M. ALLEN, of the American Rolling Mill Co., Middletown, Ohio, has been elected chairman of the metals' section executive committee of the National Safety Council. R. A. CHAFFIN, Continental Steel Corp., Kokomo, Ind., is the new vice-chairman, and M. E. TRAMMELL, Gulf States Steel Co., Alabama City, Ala., has been made secretary and news letter editor.

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ARTHUR J. TUSCANY, of Tuscany, Turner & Associates, Cleveland, who are engaged in trade association organization, management, and the handling of management problems, has been elected to a three-year term as director of the

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American Trade Association Executives, a national professional organization of executives engaged in the direction of trade associations. Mr. Tuscany is well known in the foundry industry, having for a long time been manager of the Gray Iron Institute.

❖ ❖ ❖

STANWOOD W. SPARROW has been appointed research engineer of the Studebaker Corp., South Bend, Ind., succeeding WILLIAM S. JAMES who was recently made chief engineer of the corporation. Mr. Sparrow went to Studebaker in 1926 from the Bureau of Standards in Washington where he had been in charge of the automotive power plant section. He was graduated from the Worcester Polytechnic Institute in 1911 and served in the engineering department of the Stevens-Duryea and other makers of automobiles before entering Federal research work in 1918.

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LEWIS B. LINDEMUTH, Chrysler Building, New York, has returned from England, where he has served for some time as consulting engineer for Richard Thomas & Co., Ltd., in connection with its expansion program. Next month Mr. Lindemuth will sail for Australia, where he goes each year as consultant for the Broken Hill Proprietary Co., Ltd.

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WILLIAM M. AKIN, assistant to the president of the Laclede Steel Co., St. Louis, has been elected a vice-president, to succeed the late Joseph W. Lewis. Mr. Akin previously had been elected a director of the company. He is the son of THOMAS R. AKIN, president.

This Week on the Assembly Line

(CONTINUED FROM PAGE 47)

fairly sizable addition to its factory, but this construction is needed for its own expanded manufacturing volume.

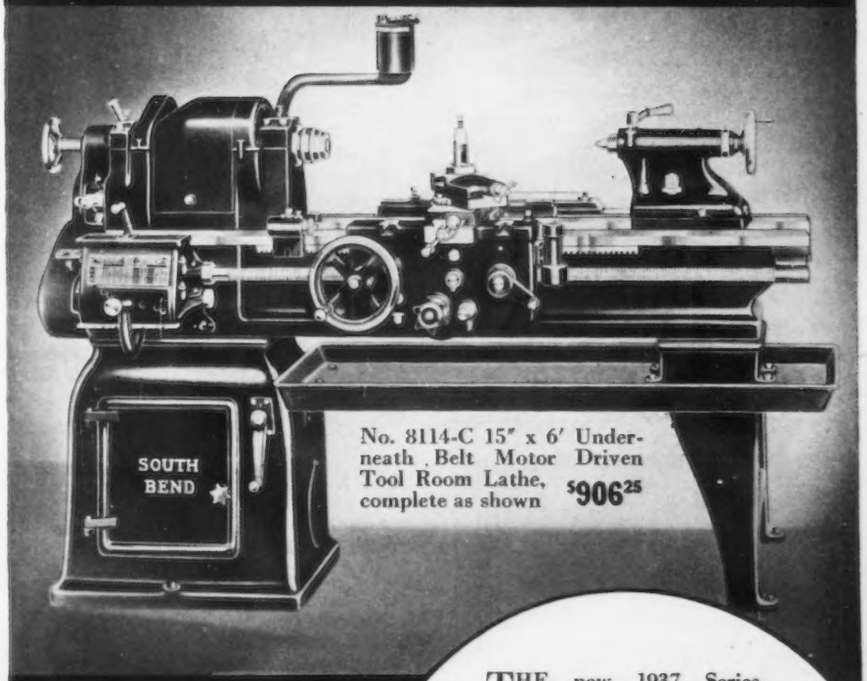
New Nash Line

In the new line Nash has the Ambassador Eight, with 125 in. wheelbase and a base price of $855; the Ambassador Six with 121 in. wheelbase and a base price of $755; and the Lafayette "400" with 117 in. wheelbase and a base price of $595. The Ambassador lines are identical in many respects and both have valve-in-head, twin ignition engines, although a different number of cylinders. The Lafayette line is easily distinguished from the Ambassador series because the bars of its die cast radiator grille are horizontal instead of vertical.

Nash has dropped louver openings on the hood and the stainless steel strips on the hood are for decoration only. One-piece seamless steel tops are standard on all models. Bodies are wider and head room has been increased. The floor tunnels have been eliminated, although hypoid rear axles are not used. The popular sleeping car feature of the Nash of 1936 has been placed in the Ambassador series for 1937, improved and refined. By using the cushions as mattresses, a 6 ft. 4 in. double bed may be made up in the back seat. The back of the rear seat lifts up to provide a clothing shelf similar to those in Pullman berths.

The springs on the Lafayette cars have been equalized front and rear, so as to oscillate at the same rate and prevent bucking action.

NEW 1937
SOUTH BEND *Precision* LATHES
Modern Lathes for Modern Industry



No. 8114-C 15″ x 6′ Underneath Belt Motor Driven Tool Room Lathe, complete as shown $906.25

9″ TO 16″ SWING
PRECISION
LATHES
WITH DOUBLE
WALL APRONS
AND
HARDENED
STEEL
SPINDLES

THE new 1937 Series, South Bend Lathes are recommended for the finest and most accurate work in the tool room, machine shop, manufacturing plant, and laboratory. Offered in sizes 9″ to 16″ swing, in bed lengths from 3′ to 14′, Motor Drive and Countershaft Drive.

Catalog No. 96 shows the new 1937 Series South Bend Precision Lathes in all sizes and styles. A valuable book for the shop man, engineer, and plant executive. Sent free, postpaid, upon request.

SOUTH BEND LATHE WORKS
569 East Madison Street
South Bend, Indiana, U. S. A.

They have pre-lubricated inserts between the three long upper leaves at their rear ends, and to prevent squeaks, the springs are packed with a special compound at the factory. A new rubber mounting for the motor is employed in the Lafayette cars and also in the Ambassador Six. The mounting is somewhat similar to Chrysler's floating power with the motor mounted high at the front just under the fan bracket and a rear rubber biscuit type mounting much lower than the front one. Overdrive or cruising gear is again optional in all models.

A new running board, the longest ever designed for an automobile, is found in all series. It begins at a point just at the rear of the front tire and runs to within a fraction of an inch of the rear fender. The purpose of this design is to protect and support that portion of the front fender that is so frequently subject to damage. Both Ambassador series have die cast radiator grilles of a new design. The large front fenders blend into the grille and the high mounted teardrop head lamps blend into the steel hood strips. On the Ambassador Eight, stainless steel fins set off the head lamps.

Willys-Overland Plans

While we are on the subject of independents, it is interesting to note that Hupp Motor Car Co. has withdrawn from the New York Automobile Show and its space has been rented to Nash. Hupp sold some of the old Chandler buildings in Cleveland recently, but the proceeds from the sale were not sufficient to give the company the working capital it needed to get into production on the 1937 jobs. Willys-Overland, on the other hand, has been recently provided with $3,500,000 of new working capital by a NewYork group of underwriters, who have taken over Willys' new securities. Debts of the old company have been liquidated satisfactorily on a rather small percentage of their face value and adjustments have been made by the city of Toledo regarding past taxes, so that Willys-Overland is now in as good shape financially as it has been for a long time. With its facilities now concentrated at Toledo in a single plant and with a car that is said to have very advanced styling and a standard wheel tread, Willys-Overland is in a position to make a real come-back this year.

The New Plymouth

The new Plymouth for 1937, just announced, has many features common with the Dodge described last week, and with other Chrysler units. Mounting the body on rubber spools carried in outriggers has enabled the front seats to be widened by 3 in. and the new seamless steel roof provides an extra inch of head room without increase in car height. The necessity of a tunnel in the rear compartment has been eliminated by the use of the hypoid rear axle, which features Chrysler's "Amola" steel, a molybdenum alloy. Telescopic airplane-type shock absorbers are also used, as on the Dodge. Easier steering is accomplished by reducing the kingpin angle to 4 deg. and also by changing the ratio of the steering gear to 16.4 to 1.

Body styling has tended to increase the effect of a larger car. The hood has been lengthened and comes far forward, extending to the foremost edge of the radiator shell. A wider windshield slopes back to a more acute angle and added sleekness is gained by the new steel top that curves back to the rear panel, which has a much greater slope than last year. Fenders are massive and have a higher crown, dipping lower in front and flaring wider at the sides. As in most of this year's cars, windshield defrosting vents are built into the bottom of the windshield and as in the case of the Dodge and other Chrysler units, all control knobs are recessed in the instrument panel to cut down injury to passengers in case of sudden stops. Throttle, choke and light switches disappear on special slides in the rounded base of the new panel and even the switch key is recessed. The windshield crank folds into a smooth round dome. Inside door handles have been redesigned so that they curve inward with no projection and the back seat passengers are protected by a padded roll across the front seat, as in the Dodge.

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Let Business Alone

(CONTINUED FROM PAGE 43)

foreign trade over night. Bootlegging promptly flourished as it always does under unpopular prohibitive laws, leading Jefferson to exclaim bitterly: "I did not expect a crop of so s u d d e n and rank growth of fraud and open opposition by force, could have grown up within the United States." He was to learn that if Government smothers legitimate enterprise, illegitimate enterprise will break out in its place. Nevertheless, he carried his distrust of the merchants and carriers, h o n e s t and dishonest, through to the last hour of his public life.

Now, there are two valid reasons why Governmental antagonism to business is distinctly out of order: First, there is no other way to recovery except through better business. And, second, business does

not exist to serve Government but Government's function is to serve business.

People, especially when on the public payroll are only too prone to forget that business means the collective activities of all the rest of us, who work. Agriculture is as much business as manufacturing, banking, mining and fishing. The small, responsible farmer is as much a business man as the vice-president of a motor car company. Government is a public authority set up by both and all the other millions in business, to preserve, protect and facilitate their efforts to do business with one another.

American business has demonstrated its ability to recover from the worst of all depressions and will doubtless continue on the up-grade during the remainder of 1936. That is, it will continue, if the cumulative effect of hampering legislation does not slow it down, as the regulations of the departments concerned with the enforcement of the various laws, are promulgated.

Any set-back, however, would be temporary because it is a foregone conclusion that the Constitutionality of the more far-reaching laws will be challenged before the Supreme Court. Many of the hastily framed provisions of these acts, which appear to be of doubtful constitutionality, will probably be voided by that tribunal.

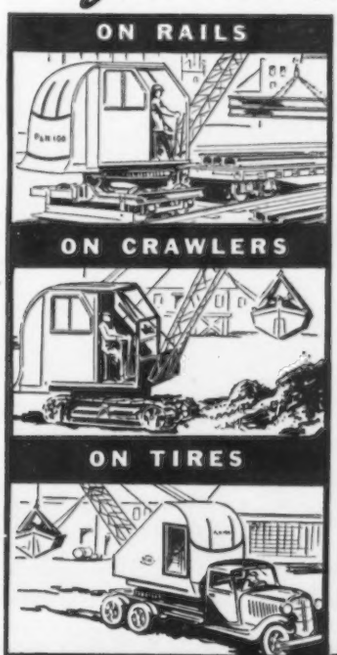
It is possible that some of the points, which are causing much business uncertainty, as the provisions of the Robinson-Patman Act, will be settled by the Supreme Court, which sits beginning October 5, before the Session of the 75th Congress has advanced very far. It is then to be hoped that, with its changed complexion, the new Congress will take the necessary steps to modify the present laws so as to make them aids to honest and legitimate business instead of handicaps.

The past three and one-half years of Federal legislation have represented one form of reaction to the debacle of 1929 and the subsequent standstill of our affairs. This reaction operates to place the blame for the economic collapse entirely on business, meaning by that principally the big financial and manufacturing institutions, with the utilities of all kinds as aiders and abettors. Drastic and punitive legislative action directed at *all* business follows as a matter of course and we find ourselves with a collection of laws, like those we have been discussing, on our hands.

Time has thrown its perspective about the events which led to the world breakdown, sufficiently to show that many complex causes brought about that dismal effect and that the misdeeds, if any, of business were not the sole or even an important cause of our own depression.

If the members of the Executive and Legislative branches of the Federal Government fail to come to a realization of this fact: That the surest and best way to help business, i.e., all of us, back to normal activity is to let it alone for a while, then the judicious and law-abiding middle class of our people is going to replace them with others who do know it.

P&H "SWITCHER CRANE"
for low cost Spur Handling



It's a great, little unit that does two big jobs—moves freight cars and handles all kinds of materials. Self-propelling on standard rail wheels, it pulls from two to seven freight cars, depending upon loads. The light 25-foot boom gives you a wide working range with hook, clamshell or magnet. It cuts car switching costs, saves time, reduces your investment in handling equipment. Ask for full information about the "Switcher Crane."

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P&H CRAWLER-TRUCK & "SWITCHER" CRANES

Carnegie-Illinois Offers to Negotiate Further on Wages

PITTSBURGH, Oct. 27. — Although Carnegie-Illinois Steel Corp. has refused a specific wage request by employee representatives, the company's answer indicates that some form of settlement involving a pay raise is in prospect. In turning down the request of the Homestead works' committee for a flat $1.12 a day increase, the management issued the following statement:

"The management cannot consider, at this time, due to present economic conditions, the request as submitted by the committee, but will be pleased to enter further negotiations for a compromise agreement."

The Pittsburgh district general council, composed of two delegates from each plant of the Carnegie-Illinois Steel Corp. in the Pittsburgh and Youngstown districts, received a similar refusal from management in their demand for a flat increase of $1.24 a day for every employee. In this case the company said, ". . . but will be glad, of course, to consider alternate or new requests at any time." This particular committee felt that the answer was unsatisfactory and has requested the Carnegie management to call a conference of the council at the earliest possible date, to arrive at a satisfactory settlement of the wage question.

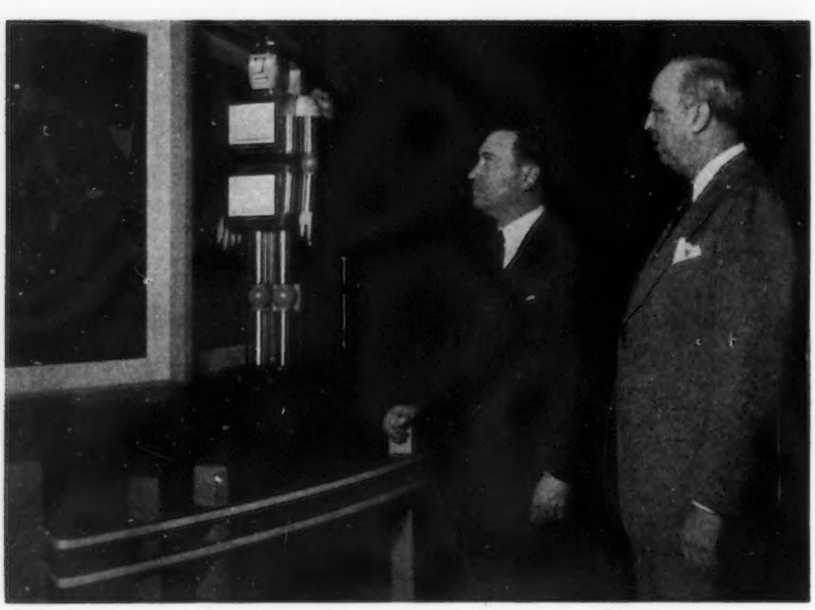
Meanwhile, the Homestead works' committee has been empowered by its constituents to get the "most advantageous compromise agreement" on wages possible. According to spokesmen, the committee will continue to ask for a "flat money" increase so that the lower paid workmen will benefit most.

Earlier in the week, the Carnegie - Illinois management had turned down a proposal by its employees that outside arbitrators be called in to determine its ability to pay higher wages. The Homestead works' committee in a recent statement said that "the only other alternative is arbitration of the decision refusing an increase of $1.12 per day with a $5 a day minimum and from available information at hand, we feel that this would not be a wise move at this time." This statement is taken to indicate that the employee representatives feel that there is a much better chance of a wage increase by a continuation of negotiations between them and the management.

At the meeting last week between the Pittsburgh district general council and the Carnegie-Illinois management, rules and regulations were drafted to govern the actions of the council. These changes will be submitted to the various plant general bodies of employee representatives for ratification, and when two-thirds of these groups ratify the proposed rules and regulations of the council, they will become part of the plan of employee representation. Proposed changes were all aimed at giving the plan a better flexibility and more power for the central committee.

All these negotiations have been going forward peaceably between management and the employee representatives. However, there has been an effort on the part of the pro-Lewis element of the committee to prevent this harmony.

Employee representatives in this area look forward to an amicable settlement of the wage question and feel that some sort of an increase will be granted in the near future.



B. F. FAIRLESS, president, Carnegie-Illinois Steel Corp., and C. V. McKaig, vice-president and general manager of sales of the Carnegie-Illinois Steel Corp., looking at part of the exhibit of the United States Steel Corp. at the National Metal Congress in Cleveland.

Labor Relations Act Before Supreme Court

WASHINGTON, Oct. 27.—Decision on the constitutionality of the Wagner-Connery Labor Relations Act at the present term of the Supreme Court of the United States has been assured. This was done when the court on Monday accepted the appeal of the Associated Press from the Second Circuit Court of Appeals in New York which held the act to be constitutional. The case involves the discharge of a reporter.

The Supreme Court also accepted for argument on the act involving an appeal by the Washington, Virginia & Maryland Coach Co. from a decision of the National Labor Relations Board.

Battelle Memorial Institute, Columbus, Ohio, has announced the beginning of a building program to provide additional facilities for industrial research. Ground for a new building was broken on Oct. 5 and it is expected that it will be ready for occupancy shortly after the first of the year. The new building has been designed to accommodate the heavy equipment necessary for commercial scale foundry work and ore handling.

Industrial Purchasing "Hardly Affected" By Robinson-Patman Act, Says G. A. Renard

IN a discussion of the Robinson-Patman Act at the Oct. 20 round table meeting of the Purchasing Agents' Association of New York, George A. Renard, executive secretary of the National Association of Purchasing Agents, said that "it seems fairly clear that the industrial type of purchasing is hardly affected by these regulations, and that it was never intended to be."

"Legitimate differentials for quality and quantity," said Mr. Renard, "are in no way affected, nor any others that allow for differences in cost of manufacture, sale or delivery. The right of the seller to select his customers and change prices to meet market conditions is expressly provided for. To be unlawful, discrimination must not only be unjustifiable, it must be injurious. It is difficult to see how sound sales policies could give greater consideration to customers, or how sound purchasing policies could demand discrimination that is unlawful.

"Federal Trade Commission officials believe this legislation will not interfere with sound business policies. That would seem to be a good basis to work from. I don't believe any honest person attending to business in an honorable way through legitimate transactions need worry over any penalties that may be inflicted. The penalties are for fraudulent practices and subterfuge. Accidental breach of these regulations is almost impossible, with costs the basis of differentials.

"If you believe that discriminatory prices by organizations supplying competitors are unfair and restrain trade, this law is a blessing. If you believe the sky is the limit, that captive or related organizations should get treatment to the disadvantage of competitors, that preferred reciprocal arrangements are entitled to inside deals, then this legislation will be a bogey, and I feel sorry for anyone who is compelled to carry out injuriously discriminative policies for his company.

"These regulations do not conflict with the standards for purchasing or with the code for buying and selling that are sponsored by the National Association of Purchasing Agents. They may handicap hard-boiled buying if that condition exists. They may furnish a splint for week-kneed selling that meets the lowest quoted price, regardless of costs. The 'second look' type of salesman and the 'confidential dope' type of buyer may object to a regulation that compels proportionately equal treatment for all customers and sound justification for all prices.

"Where does that leave us? We hear a lot about the implications of this law—how it may decentralize industry to evade these regulations and hold the transactions within state lines as intra-state commerce, which Federal regulations cannot touch. Those are not implications of this law, but of the evasions of its effect.

"I can add to the implications that may come from its evasion. Labor and farm organizations are already exempt from the restrictions of our anti-trust laws. This law, in the penal section, extends exemption to consumer cooperatives. You may find the consumer driven to the organization of cooperative associations if retailers or wholesalers continue to demand uneconomic protection at his expense. The consumer doesn't like sales taxes; the politicians have found that out. They will also find that the consumer doesn't relish sales taxes in the form of business profits any more than Government sales taxes.

"The real danger to the representative buyer, in my estimation, is not from the F.T.C. or the prosecuting authorities. The most serious posibility is the right of a disgruntled competitor to sue for triple damages. That could lead to serious abuse.

"The prudent business man will scan carefully his sources of supply, make sure they are representative and would not lend themselves to any blackmailing actions through careless or deliberately injurious discrimination. The financially irresponsible supplier will find his going rough on that account. You can't be stuck unless you have knowledge of the injurious discrimination, of course, but such actions would be very embarrassing and inconvenient even if you did successfully defend and justify your actions."

Delco Brake Will Operate Independently

EFFECTIVE Nov. 1, the Delco Brake Division of General Motors Corp. will operate independently of the Delco Products Division at Dayton, Ohio, with which it has been affiliated. R. H. Ahlers remains as general manager of the Delco Brake Division. The Delco Products Division of General Motors is the outgrowth of an organization founded in 1909 by Edward A. Deeds and Charles F. Kettering, now vice-president of General Motors Corp., in charge of research. The original organization was called the Dayton Engineering Laboratories Co., out of which the name Delco was coined. In May, 1916, Delco was made part of United Motors, which in 1918 was purchased by General Motors. Delco has been part of the General Motors family since that time. The division now manufactures shock absorbers and other parts for automobiles and electric motors for industrial use.

The Delco Brake Division was organized to manufacture certain brake parts for General Motors automobiles.

ROBERT AHLERS

Production in the country's manufacturing industries increased to a greater extent than employment during the past year, according to the National Industrial Conference Board.

. . . GERMANY . . .

. . . European scrap markets facing shortage.

° ° °

. . . Campaign to raise supplies begun in Germany.

° ° °

. . . Wire cartel extended.

HAMBURG, Germany, Oct. 25. *(Special Correspondence)*—Present conditions in European iron and steel scrap market point toward a possible shortage and high prices. In Germany a campaign to draw out larger quantities of scrap is being conducted with the aid of motion pictures. Two films have already been released in support of the campaign. Other countries which formerly were exporting scrap either have stopped altogether or have imposed restrictions. Import demand in many countries has correspondingly increased. Prohibitions on exports have been prolonged by Sweden and Austria, whereas Czechoslovakia has imposed new restrictions.

In the first eight months, this year, Great Britain imported 800,000 tons of scrap, compared with 357,000 tons in the same period last year and 182,300 tons for 1934. Exports were halved. Italy and Poland are buying more scrap. Spain at present cannot export, while Germany is allowing only moderate quantities, destined for Italy and Poland, to leave her borders. Hungary is restricting exports.

Under such circumstances, a shortage of material should rapidly develop, although the higher prices should stimulate collection and export. Only Germany's prices have been left unaltered during the past year. The dependence of Italy, Great Britain, Poland and Japan on foreign supplies is at present more pronounced than ever, and a disturbance of the supply situation can lead to serious trouble for the industry.

Export business in iron and steel products continues lively. Recent price advances, varying from 3 to 10 per cent, have not changed the situation. All products are in heavy demand. Countries which have devaluated must pay much higher prices. In the national currencies, prices have been advanced 42 per cent by Switzerland, 38 per cent by Holland and her colonies, and 32 per cent by Greece. The Swedish industry, which supplies France special pig iron and steels, has advanced quotations on these exports by 37 per cent. Despite these advances, countries generally continue to buy actively.

The international wire association has been extended for the period of another five years through 1941, and the international wire netting manufacturers' association has also been extended.

During the next 12 months about 11 German blast furnaces will be dismantled, to be replaced in part by new units.

CANADA

. . . Demand for steel and pig iron gains.

° ° °

. . . Manufacturing consumers are busier.

TORONTO, Ont., Oct. 27.— Demand for iron and steel materials is showing steady improvement in the Canadian markets and, while no large contracts were closed during the week, spot sales are increasing in volume. Good demand for sheets is reported from the automotive industry and also from electric stove and refrigerator manufacturers. The mining industry is furnishing a large part of new business to the steel industry and several large contracts for mining and milling equipment are pending. The agricultural implement industry also continues to take good quantities of iron and steel and reports big demand for implements for domestic and export use. While demand for structural steel and reinforcing bars is quiet at this time, a couple of good orders are pending.

Demand for pig iron is expanding at a steady rate with awards for the past week reported around 1200 tons, made up of lots ranging from 50 to 300 tons. Production for September jumped 35 per cent to 51,892 tons. Five blast furnaces are active, as follows: Dominion Steel & Coal Corp., 2; Steel Co. of Canada, 2; Canadian Furnace Co., 1; while Algoma Steel Corp. has one stack banked which is expected to blow in soon. Prices are firm and unchanged.

Trading in iron and steel scrap continues active with good sales reported in heavy melting steel and other steel lines. Mills in the Hamilton and Montreal areas are showing interest and taking delivery against contract, while other consumers throughout Ontario also are placing orders at more frequent intervals. Prices are firm and unchanged.

. . GREAT BRITAIN . .

. . . Demand continues to exceed steel supply.

° ° °

. . . Pig iron scarcity is unrelieved.

LONDON, England, Oct. 27. *(By Cable)*—Demand is exceeding supply in almost every department of British iron and steel manufacture and reasonably early deliveries are increasingly difficult. Makers are cautious regarding future commitments owing to rising raw material costs. Pig iron shortage is especially pronounced, hematite being as scarce as foundry and basic iron, and a sharp advance is likely when prices are reviewed at the end of the year.

Shortage of semi-finished steel was averted by large imports from the Continent, but demand for British material is unchecked and makers are sold out up to the end of the year.

Heavy rolled steel is heavily specified and deliveries, especially structural material, are behindhand. Shipbuilders are also complaining about the delay, which, however, is not yet serious.

Home demand for black and galvanized sheets is substantial, and export is slightly better but still remains unsatisfactory. Otherwise export business is steady.

The Lugano meeting of the International Tin Plate Cartel decided to leave prices temporarily unchanged. Home export business is fair.

Continental iron and steel markets are brisker and November prospects are viewed hopefully. Slower United States demand is offset by a Far Eastern revival and good business continues with South America and Scandinavia, especially in bars, sections and wire. International tube talks have been postponed until the end of Novemmer.

United States Steel Corp. Pays $3.75 Dividend—Wages to Be Revamped

DIRECTORS of the United States Steel Corp. on Tuesday afternoon declared a dividend of $3.75 on the preferred stock, which covers the regular payment for the third quarter and the arrears for the two previous quarters of this year. This leaves the total arrearages as of the end of 1935 at $58,545,679, or $16.25 a share.

Earnings in the third quarter totaled $30,192,889. After deductions for depreciation and other fixed charges, the amount available for dividends was $13,636,177. The amount of the dividends declared Tuesday was $18,914,758, compared with a net income earned for stock during the nine months of $29,874,904, leaving a net after dividends for the nine months of $10,960,147.

In a statement issued after the directors' meeting, Myron C. Taylor, chairman of the board, said that "the broadened demands for steel products indicated at the time of issuance of the second quarter's statement continued during the third quarter on substantially the same level." Operations for the quarter measured by finished products averaged 63.6 per cent, as compared with 60.8 per cent in the June quarter. For the nine months the average was 57.1 per cent against 37.1 per cent during the same period of 1935. It was said that prices in the third quarter averaged slightly better than in the second quarter, but were about five per cent under those secured last year. It was also stated that the unexpended balance for authorized plant improvements made up to Oct. 1 is $84,000,000. The number of employees this year has averaged 216,709, a gain of 11.6 per cent over the 1935 average of 194,222. The total pay roll has gained 31.6 per cent this year, the aggregate for nine months having been $242,635,540, as against $184,361,434 last year. The average number of hours worked by each employee per month was 169.9 this year, as compared with 144.8 last year, while the average hourly earnings remained the same at 73c. an hour.

On the wage question, Mr. Taylor's statement read as follows: "During the past year the management has been engaged in an intensive study of the wage structure in the subsidiary companies of the corporation. In many cases, differentials between occupations are either too great or too small. The problem, therefore, has been to develop a sound method of evaluation of employment services in order that the basic wage structure shall permanently reflect in an equitable manner the relative values of the various occupations. This work in many of the plants of the corporation is now well advanced, and, at an early date, will be in form for submission to and discussion with employee representatives and employees generally." Mr. Taylor, when intervied later by press representatives, declined to amplify this statement.

The board of directors amended the by-laws to increase the number of directors to 18, three more than at present. Irving Sands Olds, of the legal firm of White & Case, New York, was elected to one of the new directorships. Two other young directors will be elected later.

Jones & Laughlin Steel Corp., Pittsburgh, reports a net income for the third quarter ended Sept. 30, after regular deductions, of $1,870,860. The company also reports a net income of $2,053,320 for the nine-month period ended Sept. 30.

The Board of Directors at its meeting, held Oct. 27, decided not to declare the regular dividend of its cumulative seven per cent preferred stock, payable Jan. 1, 1937. However, the board declared a dividend of one and three-quarters per cent ($1.75 per share), on account of arrearage in dividends on its preferred stock, to holders of record at the close of business Nov. 30, 1936, payable Dec. 15, 1936.

A. M. Castle Co. has declared an extra dividend of 50c. and a regular quarterly dividend of 75c., both payable Nov. 10. The company intimates an additional dividend will be considered before the end of the year.

Inland Steel Co. reported a net profit of $3,788,199 for the third quarter, as against $3,298,191 in the second quarter.

27,128 New Freight Cars Put in Service

MORE new freight cars were placed in service in the first nine months of this year by Class I railroads of the United States than in any other corresponding period since 1930, the Association of American Railroads has announced. In the first nine months of 1936 new freight cars placed in service on American railroads totaled 27,178, compared with 3172 cars installed in the same period of 1935, and 19,109 cars in the same period of 1934.

New freight cars placed in service in the first nine months this year included the following: Coal cars, 12,007; box cars, 11,908, of which 8893 were plain and 3015 were automobile cars; refrigerator cars, 2181, and 1082 other freight cars of miscellaneous kinds.

New locomotives placed in service in the first nine months this year included 59 steam and 21 electric and diesel engines, compared with 28 steam and 101 electric locomotives installed in service in the same period of 1935, and 14 steam and 12 electric locomotives installed in service in the first nine months of 1934. In the corresponding period of 1930, 632 locomotives were placed in service.

Class I railroads had 19,377 new freight cars on order on Oct. 1, this year, compared with 7441 cars on Oct. 1, 1935, and 5495 cars on Oct. 1, 1934.

New locomotives on order on Oct. 1, this year, included 50 steam and 16 electric and diesel engines, compared with 14 steam locomotives and three electrics on order on Oct. 1, 1935, and 37 steam and 104 electric locomotives on order on Oct. 1, 1934.

THEODORE KUPFER, SR., founder and president of the Theodore Kupfer Foundry & Iron Works, Inc., Madison, Wis., died on Oct. 11, following a heart attack. He was born in New York State in 1861 but had lived in Madison since early boyhood. After connections with Madison foundries he established his own business in 1891. His son, THEODORE, JR., is vice-president, and his son-in-law, J. J. GERHARDT, is secretary and treasurer.

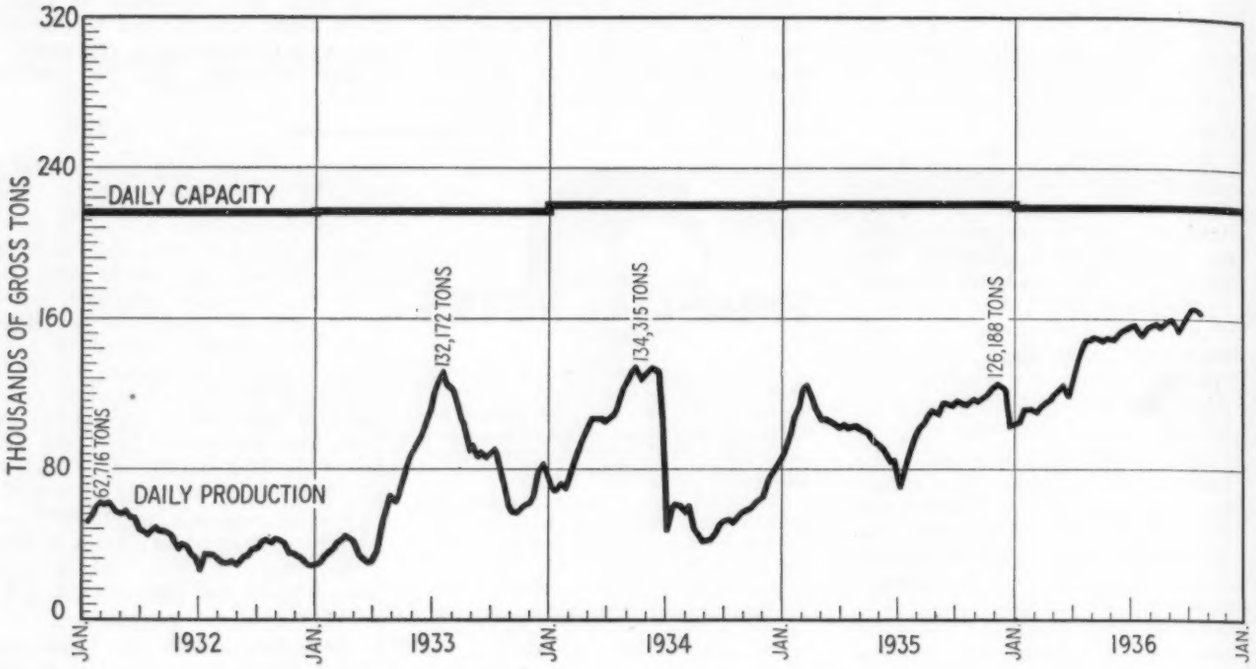
❖ ❖ ❖

S. A. CRONE, who has been president of the Buffalo Brake Beam Co., New York, since its formation in 1902, died at his home in Montclair, N. J., on Oct. 16, aged 77 years. He had been identified with the railway service field throughout his entire business life.

STEEL INGOT PRODUCTION

Daily Tonnage of Bessemer and Open-Hearth Steel Ingots Produced by Weeks, 1932-1936

Current Week	Last Week	Weeks Ended Nov. 2, 1935	Nov. 3, 1934	Nov. 4, 1933	Nov. 5, 1932
162,410	162,410	118,439	57,249	60,669	43,252



Figures for the current week are not indicated on the chart until the following week.

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

District	Current Week	Last Week	Weeks Ended Oct. 3, 1936	Nov. 2, 1935	Nov. 3, 1934
Pittsburgh	70.0	72.0	74.0	45.0	18.0
Chicago	75.0	74.5	74.0	55.5	30.0
Valleys	76.0	76.0	82.0	62.0	22.0
Philadelphia	55.5	55.5	55.0	40.0	24.0
Cleveland	84.0	82.0	80.0	69.0	37.0
Buffalo	78.0	78.0	79.0	40.0	27.0
Wheeling	93.0	93.0	96.0	78.0	30.0
Southern	58.0	58.0	60.5	54.0	25.0
Ohio River	95.0	88.0	92.0	85.0	30.0
Western	59.0	59.0	70.0	35.0	15.0
St. Louis	72.0	72.0	73.5	55.5	25.0
Detroit	100.0	95.0	95.0	90.0	76.0
Eastern	90.0	90.0	90.0	35.0	20.0
Aggregate	74.0	74.0	75.0	53.5	26.0
Average Year to Date	65.5	65.3	64.6	47.1	38.3

Weekly Booking of Construction Steel

FROM THE IRON AGE

	Week Ended Oct. 27, 1936	Oct. 20, 1936	Sept. 29, 1936	Oct. 29, 1935	Year to Date 1936	1935
Fabricated structural steel awards	9,300	9,850	20,450	17,900	878,380	635,410
Fabricated plate awards	9,760	1,480	1,790	4,700	190,455	123,200
Steel sheet piling awards	1,575	1,970	0	0	48,265	55,410
Reinforcing bar awards	7,145	1,525	4,610	9,925	291,900	275,690
Total Lettings of Construction Steel	27,780	14,825	26,850	32,525	1,409,000	1,089,710

. . . SUMMARY OF THE WEEK. . . .

. . . Pittsburgh production rate lower, affected by lull in heavy products.

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. . . Elsewhere, however, there have been gains, holding country's average unchanged.

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. . . Railroad buying expected to take up some of slack in heavy materials.

A LULL in new steel business, particularly in the heavy products, has brought down the Pittsburgh operating rate to 70 per cent, a drop of two points, but the average for the country as a whole is substantially unchanged at 74 per cent because of increases in the Cleveland-Lorain district and at Chicago, Detroit and in southern Ohio.

The Pittsburgh district, where capacity in the heavy products predominates, is chiefly affected by an inclination to mark time until after election in building construction projects, which also face seasonal curtailment with the approach of winter. Other districts have been aided by the release of deferred specifications by some automobile companies that have been slower than expected in getting into production on new models.

While for the first time in many weeks the indications do not all point in the direction of a continued upward movement in steel production, the present easier situation has not changed the opinion of the industry that conditions are highly favorable for an operating rate varying from 70 to 75 per cent during the remainder of the year, with the possibility that December, normally a poor month, will this year reverse its usual trend. This view is predicated on the assumption that higher steel prices will prevail in the first quarter and will be anticipated by a fresh buying movement.

Despite the falling off in bookings of structural shapes, plates and some other products, the sheet demand will tax the full facilities of the industry for a good many weeks. Tin plate production has risen to 93 per cent of capacity, based on advance rollings for can manufacturers, who expect they will need every ton of tin plate they can get for 1937 because of the drought this year and the expanding uses for cans.

SOME of the slack in the heavier products may be taken up by railroad equipment requirements and rail purchases. The latter have been delayed by the extension of the current price to Dec. 1 for shipment through March, but heavy tonnages are pending, including 48,500 tons for the Chicago & North Western. The Kansas City Southern has ordered 10 locomotives and 800 steel box cars, and the Kennecott Copper Co. has bought 250 large ore cars. The Denver & Rio Grande Western will buy 15 locomotives and the Western Pacific is inquiring for 150 freight cars. It is estimated that Western roads centering at Chicago will come into the market for a total of 20,000 cars within the next few months. The New York Central will award orders shortly for 50 locomotives.

PIG iron shipments this month probably will exceed those of any previous month of the year. Not only is foundry melt increasing, but consumers are protecting themselves to some extent against a possible price rise of $1 or $2 a ton for the first quarter. Furnace stocks are being reduced. Although October statistics, to be published next week, will show a sharp rise in production, most of this has been for steelmaking purposes. Some steel companies that cater to the merchant trade are restricting pig iron sales because of their own needs. Strictly merchant furnaces that are not self-contained as to coke will have difficulty in procuring supplies, as by-product ovens have had to curtail shipments to their heating trade and beehive output is limited to contractual commitments.

A FURTHER decline of 25c. a ton in heavy melting steel scrap at Pittsburgh has brought THE IRON AGE scrap composite down to $16.50 from the year's peak of $16.75 in the third week of September. Although scrap markets generally are quiet, there is an undertone of strength because of the expectation that mills will have to make fresh purchases of importance within a few weeks.

THE IRON AGE index of capital goods activity has moved upward to 83.6 (1925-'27 average equaling 100), as against 81.3 in the preceding week.

. . . PITTSBURGH . . .

. . . Ingot output down to 70 per cent as rollings of heavy products decline.

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. . . No drastic falling off in production is expected.

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. . . Tin plate operations increase; steel scrap off 25c. a ton.

PITTSBURGH, Oct. 27.—Ingot output in the Pittsburgh district has eased off two points this week to 70 per cent of capacity. This is the second decline since the record high reached a few weeks ago and is entirely attributable to the falling off in specifications for heavy plates and shapes. Operations in the Wheeling district remain unchanged at 93 per cent.

Although demand for structural material has been receding consistently for the past several weeks, there is a chance that better specifications for these products will materialize in the near future.

No drastic falling off in operations is looked for by producers. Present backlogs on other finished products are still substantial and are acting as a cushion. There is some evidence that a better tone in new buying will materialize within the near future.

While there has been no appreciable change in the amount of bookings for hot-rolled bars over the past week, there was a slight improvement. Sheet specifications were better than a week ago and the same may be said for tin plate bookings. A better volume of orders for the latter has resulted in an increase in operations of three points to 93 per cent. Orders for hot and cold-rolled strip steel show no tendency to deviate from recent steady buying.

Two factors which might affect a balance between lighter demand and a resumption of a better volume of business is the distinct possibility of a wage increase, which observers feel would be followed by a price adjustment for first quarter delivery, and the possibility of labor disturbances after the Presidential election. While the John L. Lewis Committee on Industrial Organization in the aggregate has not made much success in organizing steel workers, nevertheless gains have been made within the past month which might cause the leaders of the Lewis group to test their strength before next spring.

Inquiries and awards during the past week were rather scarce. American Bridge Co. will fabricate 1520 tons of steel for the National Armory at Teaneck, N. J., and the Dravo Contracting Co., Pittsburgh, will use about 1800 tons of plates in the construction of 12 standard coal barges for the American Barge Lines, Louisville, Ky. Bethlehem Steel Co. has been awarded the contract to furnish approximately 1575 tons of piling for Mississippi River dam No. 12 at Bellevue, Iowa.

The leading producer of sheets in this district has announced a revision of the quantity extras and deductions set-up. Under the new practice, size means one gage or thickness and one width, while previously length had been included. In determining the quantity deductions, the total weight of one grade and one analysis may include two or more sizes, provided not less than 25 tons of any one size is contained in the order. Under the old set-up the deductions only applied where one grade one analysis, and one size were ordered. There has also been a classification of the shipment to one destination at one time in that the material must be shipped within a period of not exceeding 15 days. These revisions apply to hot-rolled, hot-rolled annealed and cold-rolled sheets, long ternes and hot-rolled strip steel.

The scrap market is slightly easier, No. 1 heavy melting having eased off 25c. a ton.

Pig Iron

There has been no decrease in the demand in the past week. Some consumers who had not placed contracts for fourth quarter requirements have now done so. Some producers have turned down orders for steel-making iron as their production is needed for their own requirements. The opinion still prevails that an increase in prices will materialize before the first of the year. A few customers have unsuccessfully attempted to place contracts for first quarter delivery at $1 a ton above present quotations.

Semi-Finished Steel

Production continues at a high rate and some secondary mills are having difficulty obtaining supplies. New specifications are still light, but producers are actively engaged on orders taken at the old price last month. A particularly good movement of skelp is in evidence, reflecting a better tone in demand for standard pipe.

Bolts, Nuts and Rivets

New business is slightly better this week owing to orders from the railroads which have expanded car repair programs. Specifications from this source are sufficient to maintain a fairly good operating rate over the next several weeks. Automobile manufacturers are now taking fair tonnages, but not as great as expected. Miscellaneous demand is showing some signs of better activity.

Bars

Aggregate specifications show a slight improvement over a week ago, but are still far below those received last month. Backlogs have eased off slightly and average around four to six weeks, although some sizes are running a little longer. Although much of the heavy tonnage placed last month was accepted for shipment at the mills' convenience, considerable pressure is now being exerted by some sources for early delivery. Shipments to automobile manufacturers have not been as large as was expected; however, it is the opinion that better volume of releases will be forthcoming within the next few weeks. Demand from forge shops has shown improvement recently.

Cold-Finished Bars

Backlogs remain at six to eight weeks and, even though new specifications have been light since the first of the month, they have been enough to prevent any appreciable headway being made in cutting down the tonnage of unfilled orders. Producers do not expect any sharp upturn in new business be-

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous; Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Oct. 27, 1936	Oct. 20, 1936	Sept. 29, 1936	Oct. 29, 1935
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	35.00
Rerolling billets, Pittsburgh	32.00	32.00	32.00	27.00
Sheet bars, Pittsburgh	32.00	32.00	32.00	28.00
Slabs, Pittsburgh	32.00	32.00	32.00	27.00
Forging billets, Pittsburgh	39.00	39.00	39.00	35.00
Wire rods, Nos. 4 and 5, P'gh	40.00	40.00	40.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.80	1.80	1.80	1.70

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.05	2.05	2.05	1.85
Bars, Chicago	2.10	2.10	2.10	1.90
Bars, Cleveland	2.10	2.10	2.10	1.90
Bars, New York	2.40	2.40	2.40	2.20
Plates, Pittsburgh	1.90	1.90	1.90	1.80
Plates, Chicago	1.95	1.95	1.95	1.85
Plates, New York	2.19	2.19	2.19	2.09
Structural shapes, Pittsburgh	1.90	1.90	1.90	1.80
Structural shapes, Chicago	1.95	1.95	1.95	1.85
Structural shapes, New York	2.16¼	2.16¼	2.16¼	2.06¼
Cold-finished bars, P'gh	2.35	2.35	2.35	1.95
Hot-rolled strips, P'gh	1.95	1.95	1.95	1.85
Cold-rolled strips, P'gh	2.60	2.60	2.60	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.60	2.60	2.60	2.40
Hot-rolled annealed sheets, No. 24, Gary	2.70	2.70	2.70	2.50
Sheets, galv., No. 24, P'gh	3.20	3.20	3.20	3.10
Sheets, galv., No. 24, Gary	3.30	3.30	3.30	3.20
Hot-rolled sheets, No. 10, Pittsburgh	1.95	1.95	1.95	1.85
Hot-rolled sheets, No. 10, Gary	2.05	2.05	2.05	1.95
Cold-rolled sheets, No. 20, Pittsburgh	3.05	3.05	3.05	2.95
Cold-rolled sheets, No. 20, Gary	3.15	3.15	3.15	3.05
Wire nails, Pittsburgh	2.05	2.05	2.05	2.40
Wire nails, Chicago dist. mill	2.10	2.10	2.10	2.45
Plain wire, Pittsburgh	2.50	2.50	2.50	2.30
Plain wire, Chicago dist. mill	2.55	2.55	2.55	2.35
Barbed wire, galv., P'gh	2.55	2.55	2.55	2.80
Barbed wire, galv., Chicago dist. mill	2.60	2.60	2.60	2.85
Tin plate, 100 lb. box, P'gh.	$5.25	$5.25	$5.25	$5.25

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:	Oct. 27, 1936	Oct. 20, 1936	Sept. 29, 1936	Oct. 29, 1935
No. 2 fdy., Philadelphia	$21.3132	$21.3132	$21.3132	$20.3132
No. 2, Valley furnace	19.50	19.50	19.50	18.50
No. 2, Southern Cin'ti	20.2007	20.2007	20.2007	19.2007
No. 2, Birmingham†	15.88	15.88	15.88	14.50
No. 2, foundry, Chicago*	19.50	19.50	19.50	19.50
Basic, del'd eastern Pa.	20.8132	20.8132	20.8132	19.8132
Basic, Valley furnace	19.00	19.00	19.00	18.00
Malleable, Chicago*	19.50	19.50	19.50	19.50
Malleable, Valley	19.50	19.50	19.50	18.50
L. S. charcoal, Chicago	25.7528	25.7528	25.7528	25.2528
Ferromanganese, seab'd carlots	75.00	75.00	75.00	85.00

†This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	*$17.50*	$17.75	$18.25	$13.25
Heavy melting steel, Phila.	15.75	15.75	15.75	12.00
Heavy melting steel, Ch'go	16.25	16.25	16.25	12.50
Carwheels, Chicago	16.50	16.50	16.50	12.75
Carwheels, Philadelphia	16.75	16.75	16.75	12.75
No. 1 cast, Pittsburgh	16.25	16.25	16.25	14.25
No. 1 cast, Philadelphia	16.75	16.75	16.75	12.75
No. 1 cast, Ch'go (net ton)	14.00	14.00	14.00	11.25
No. 1 RR. wrot., Phila.	15.75	15.75	15.75	12.25
No. 1 RR. wrot., Ch'go (net)	14.25	14.25	14.25	9.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.75	$3.75	$3.75	$3.60
Foundry coke, prompt	4.25	4.25	4.25	4.25

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	**10.00**	9.75	9.75	9.00
Lake copper, New York	**10.12**	9.87½	9.87½	9.37½
Tin (Straits), New York	*44.45*	44.60	45.40	50.75
Zinc, East St. Louis	4.85	4.85	4.85	4.85
Zinc, New York	5.22½	5.22½	5.22½	5.22½
Lead, St. Louis	**4.55**	4.45	4.45	4.35
Lead, New York	**4.70**	4.60	4.60	4.50
Antimony (Asiatic), N. Y.	12.50	12.50	12.50	16.37½

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Oct. 27, 1936	2.197c. a Lb.	$18.73 a Gross Ton	$16.50 a Gross Ton
One week ago	2.197c.	18.73	16.58
One month ago	2.197c.	18.73	16.75
One year ago	2.130c.	18.01	12.58
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products represent 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel HIGH	Finished Steel LOW	Pig Iron HIGH	Pig Iron LOW	Steel Scrap HIGH	Steel Scrap LOW
1936	2.197c., Sept. 29	2.084c., Mar. 10	$18.84, Jan. 7	$18.73, Aug. 11	$16.75, Sept. 22	$12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, April 23
1934	2.199c., April 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

fore the next two or three weeks, but indications are already appearing that material ordered by customers last month is badly needed. Consistent pressure is being brought to bear for deliveries. Especially is this true with regard to manufacturers of textile machinery and agricultural implements. Incidentally, orders from these sources were placed over a month ago to be shipped at the mills' convenience.

Shapes and Plates

Demand for both heavy plates and shapes continues to level off. This factor is influencing production in this district, since much of the present finishing capacity is set up for these items. Awards and inquiries this week are about equally divided between privately and publicly financed projects. American Bridge Co. will fabricate 1520 tons of steel for the National Guard armory at Teaneck, N. J. This company will also furnish 350 tons of material for a factory building extension for the Chase Brass & Copper Co., Waterbury, Conn. The Dravo Contracting Co., Pittsburgh, will use about 1800 tons of plates in the construction of 12 standard coal barges for the American Barge Lines, Louisville, Ky.

Reinforcing Steel

Bethlehem Steel Co. has received an award for approximately 750 tons of rail steel reinforcing bars to be used in the construction of a stock building for Joseph T. Finch & Co., Schenley, Pa. New inquiries have been light and producers look for a letdown in awards in the near future, owing to seasonal trends.

Strip

Orders for both hot and cold-rolled strip are flowing in freely, with little, if any, change being registered from last week. Automobile parts makers have been specifying in better volume, while miscellaneous users have shown no tendency to curtail their orders. Manufacturers of electrical appliances are taking fair tonnages, while builders' hardware interests show better activity. Manufacturers of business machines, who have been good consumers for strip steels in the past several months, are reported to be enjoying the best volume of sales in their history.

Tin Plate

Specifications have picked up in the past week and involve orders both for general line can material and 1937 packers' requirements. As a result, operations are up three points to 93 per cent. A change in ordering practices by tin plate consumers has taken place over the past year with a result that operations are much more stabilized than was the case a few years ago. There is a greater disposition on the part of consumers to anticipate their requirements in order to get steady uninterrupted delivery of tin plate. New uses for tin containers have helped considerably in the stabilization of production.

Steel Sheet Piling

New business has slowed up some, with no major awards having been made within the past week. Bids are in on a sea wall involving 966 tons at Roughans Point, Revere, Mass. Contract will be let soon by U. S. Engineer's Office at Boston for sewers at Haverhill, Mass., involving 650 tons.

Tubular Products

Specifications for oil-country goods are again showing improvement. Demand for standard pipe continues to show a steady increase. Some of this gain is due to increased building programs, while renovation and installation of heating equipment is also taking a fair volume of standard pipe. Specification and movement of boiler tubing both for railroads and merchant trade is showing no tendency to subside from recent activity.

Wire Products

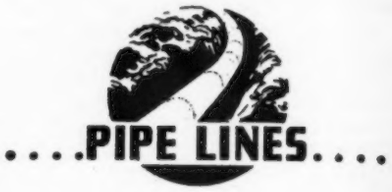
Producers in this district are actively engaged in the production of manufacturers' wire owing to heavy backlogs built up last month. Over a week ago mills were able to wind up all merchant wire item business taken at the low prices in existence last month. Meanwhile, specifications at the new prices are still no better than they were a week ago. Warehouse stocks appear to be spotty in that some jobbers anticipated farther ahead than others. There seems to be some difficulty in gaging consumer activity. Meanwhile, mills look for a better volume of specifications within the next two or three weeks.

Sheets

Total specifications have picked up over a week ago, with demand emanating from widely diversified sources. Automobile releases are better and implement makers are taking a fair share of material. Some specifications being placed at this time are for 1937 programs of electrical appliance manufacturers and makers of air-conditioning equipment.

Coal and Coke

Coal production continues to move forward, with producers in this territory making every effort to fulfill contracts to the Lake regions before the close of navigation. The recent lull in domestic consumption is subsiding and both dealers and consumers are in the market for additional supplies. There is no change in the status of the furnace coke market, but a slightly easier tone has appeared with respect to domestic beehive coke supplies. The resumption of a few ovens in different localities which would be unable to furnish contracts on furnace coke have made it easier to obtain domestic size beehive coke. More inquiries, however, are being received than can be filled, and colder weather will immediately tighten up on supplies.



Bitter Root Irrigation District, Hamilton, Mont., Stanley Antrim and Anton Neilson, directors, closes bids Nov. 7 for 2844 ft. of 70-in. steel pipe for irrigation system in Coyote Gulch, Willoughby Gulch and Spooner Gulch districts, respectively. Cost about $70,000. Financing has been arranged. Later bids will be asked for similar steel pipe line in Pine Hollow district, near Stevensville, Mont., replacing existing lines.

Iowa City Light & Power Co., Iowa City, Iowa, plans steel pipe lines for natural gas distribution in municipality, for which franchise has been secured. Cost about $50,000. Roscoe E. Taylor is general manager.

Illinois Pipe Line Co., Casper, Wyo., has awarded contract to White Deer Construction Co., Oklahoma City, for 6-in. welded steel pipe line from point near Lusk, in Lance Creek oil field, Wyo., to Fort Laramie, Wyo., about 40 miles, for crude oil transmission, at price of about $240,000. Connection will be made with company's bulk oil terminal at last noted point. Company is affiliated with Ohio Oil Co., Findlay, Ohio.

Cabot Gas Corp., Olean, N. Y., operated by Godfrey L. Cabot, Inc., Boston, has let contract to I. C. Little Co., Dallas, Tex., for 14-in. welded steel pipe line from gas field in western Pennsylvania to Rochester, N. Y., about 92 miles. Award for pipe has been made to A. O. Smith Corp., Milwaukee, as recently noted in these columns. Entire project will cost over $1,500,000.

Houston Natural Gas Co., Petroleum Building, Houston, Tex., plans steel pipe lines for natural gas distribution at Bishop, Tex., where franchise has been secured. Main welded steel pipe line will be built to town limits for bulk supply to distributing station.

General Purchasing Officer, Panama Canal, Washington, asks bids until Nov. 5 for 600 ft. of 3½-in., 6000 ft. of 2½-in., 10,000 ft. of 2-in., and 20,000 ft. of 1½-in. galvanized welded steel pipe (Schedule 3191).

Eagle Point, Ore., closes bids Nov. 4 for 13,400 ft. of 4 and 6-in. steel pipe, dipped and wrapped, for water system; also for 4100 ft. of 2-in. galvanized iron pipe. William Brown is mayor in charge.

Nottawa Pipe Line Co., Ltd., Hepworth, Ont., plans steel pipe lines for local natural gas distribution. Project will be carried out by company forces. Cost over $80,000.

. . . . CHICAGO . . . .

. . . New business in heavy tonnage products shows a decline.

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. . . Railroad equipment purchases expected to make headway.

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. . . Ingot output moves up slightly, based chiefly on lighter products.

CHICAGO, Oct. 27. — Scarcity of new business in the heavy tonnage products is causing real concern to steel producers. The rail market is quiet and the feeling is growing that the railroads may not make a real move until price policies are definitely established, and that a decision to raise prices will bring much-needed tonnage to rail mills which are within about a few weeks of closing down.

Approach of winter weather is one determining factor in the slowing down of heavy structural awards, and the outlook for plate use is closely tied to the railroad equipment field. Car shortages are real and not imaginary, and shippers in many lines of endeavor are convinced that car buying must expand. Steel producers sum up "feelers" which come to them and they then count about 20,000 cars which can be expected to reach this market.

The labor picture is casting a heavier shadow over the future. Strife in Wisconsin is particularly noticeable. One plant is having its third strike in that number of years and threats are being made in numerous other directions. This condition, already having its effects on steel shipments, may be of major importance over the remaining months of the year.

Ingot output has moved up one-half point to 75 per cent of capacity, impetus coming from flat-rolled products and the general steel requirements of the automobile trade and miscellaneous users.

The Chicago scrap market appears to be undisturbed by events which are taking place in neighboring centers. Most signs point to firm prices.

Chicago & North Western will buy 48,500 tons of rails in addition to necessary accessories. Denver & Rio Grande Western will buy 10 freight and five passenger locomotives for 1937 delivery.

Pig Iron

Shipments are gaining and October will show the highest movement of the year by about 10 per cent. New buying is on a good footing, considering the volume of purchases in September. A disturbing factor is the growth of labor unrest in Wisconsin, where the strike spirit is growing. Producers, with costs mounting, are eyeing the railroads' move to make permanent a part of the surcharges which expire at the end of December.

Rails

Railroad budgets are taking shape. The setting of current prices forward to Dec. 1 has served to put less stress on quick action, and there are those in the trade who feel that some railroads may not act until higher price announcements are made. It is hinted that such an event may take place within the next few weeks. As the market drags, rail rolling schedules are pointing downward, though moderate production is expected to continue to about the middle of November. Light rails are in good demand, but the accessory market is listless.

Wire Products

New sales have grown quite spotty, but sellers are not disturbed because shipments are at a high rate and they believe that actual consumption is heavy. They expect commitments to broaden out within the next three to four weeks. Furniture manufacturers are exceptionally busy and building hardware is active. Farm implement manufacturers are gradually working toward a peak which is expected to be reached about mid-January. Electrical wire and rope are well above the average for the year to date, both commodities being buoyed by numerous orders for small quantities. Wire mill operations average close to 75 per cent of capacity, based on tonnage rating. This is close to practical output as dictated by the character of incoming business.

Bars

Recent specifications from automobile builders show that production is slowly swinging upward, but that it has not reached the level expected for the last week of October. Die troubles are known to be one of the stumbling blocks and there is also the hint that several manufacturers of low-priced cars may be jockeying for position in the price field. Farm implement manufacturers are taking less steel, but shipments to them within recent weeks have been ample to satisfy immediate needs. They are expected to specify more freely by the end of the month. Heavy hardware manufacturers are busy.

Structural Material

Mills are feeling the pinch of lighter specifications and shipments of structural materials, a condition which they do not expect to improve because of the approach of winter weather with resultant slowing down of outdoor construction work. This drop in the heavy tonnage items is the controlling factor in bringing about variations in ingot production. Fabricating shops are faced with lighter backlogs and they now stand at the start of winter with operations at an average not much above 50 per cent of capacity. The larger awards are scattered all the way from the Gulf Coast to Milwaukee and they account for only about 3000 tons. Small and miscellaneous business reaching shops accounts for an additional 2500 tons.

Plates

Extension of the Moffat Tunnel in Colorado calls for 5000 tons, and sewer and viaduct work at Detroit will take 3250 tons of plates and shapes. The call for plates by tank shops is tapering and gradually decreasing tonnages are being sought by fabricators of buildings and bridges. The real hope for plate mills lies in railroad equipment, and even this hope is nebulous in view of the fact that current car inquiries are all of

small size. Nevertheless some larger business is coming to the front. Steel producers believe that they can count not less than 20,000 cars which will reach the market in the near future. Some high strength steel is now being taken by railroad shops for heavy repair work.

Sheets

New orders continue to grow and backlogs are expanding. Average deliveries on important moving products range from eight to 10 weeks and the galvanized product cannot be had in less than six to eight weeks.

Reinforcing Bars

Several large projects are holding the attention of reinforcing bar dealers, but when they look ahead for future heavy tonnage projects they are somewhat skeptical. Low bidder has been announced on the 700-ton museum project in Chicago and bids will be taken early in November on the Mississippi River dam at LeClaire, Iowa. Road slab work will be sketchy over the next few weeks and will then disappear until spring. Indiana has awarded 500 tons, but this steel will not be taken out until late in April, or in May. Prices still show some variation on attractive tonnage projects.

Cast Iron Pipe

The Middle West is lacking in the matter of large work. Engineers' offices, being slack, point to continuation of this condition until time to prepare spring programs. However, the picture is not entirely black. Municipalities, railroads, and various industries are stepping in and out of the market for small lots, often not over one-half carload at a time, but the aggregate of this business is satisfying. All going tonnages bring top prices.

Labor Legislation Conference Nov. 9-11

WASHINGTON, Oct. 27.—The third national conference on labor legislation will meet in Washington on Nov. 9, 10 and 11, it has been announced by Secretary of Labor Frances Perkins. The governors of the States have been asked to send official delegates and state federations of labor will also be represented. The program will include consideration of progress made in State labor legislation and the reports of committees appointed following the conference held last year in Asheville, N. C.

..BIRMINGHAM..

. . . Large amount of work ahead in South.

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. . . Mill bookings heavy and prospects good.

BIRMINGHAM, Oct. 27. — More than 110,000 tons of rail have been booked by the Tennessee Coal, Iron & Railroad Co., also large quantities of tie plates, bolts, spikes and other track material. There is still a large tonnage in prospect as a number of railroads have not yet come into the market. Additional orders are expected within the next few weeks. The railroads now have until Dec. 1 to place orders for delivery before March 31. This deadline, together with prospects of an increase in price on Jan. 1, accounts in part for the concentrated rail buying at the present time.

The three largest orders taken by Tennessee, which have been previously reported in THE IRON AGE, are Southern Pacific, 29,123 tons; Louisville & Nashville, 27,000 tons; Southern Railway, 23,000 tons.

Nov. 1 has been set as the date for the reopening of the Ensley rail mill and business now on hand and in immediate prospect will provide steady operations for at least five months.

Gulf States Steel Co. is not yet ready to announce plans for new developments at its Gadsden, Ala., works. It is generally believed that a tinning department will be established. George W. Burpee, of New York, consulting engineer for the company, was in the district last week, looking after various details of the proposed improvements.

Steel bookings continue unusually heavy. October will be one of the best months the Birmingham district has had in many years. The outlook is also highly favorable. The amount of heavy steel orders, including rails, now on the books of the steel manufacturers in this district, or in immediate prospect, is probably more than 200,000 tons. The improvements at Lock 17 on the Warrior River, the new dam and lock at Tuscaloosa on the Warrior River, the 825 cars booked by the Bessemer plant of the Pullman-Standard Car Mfg. Co., the new Fairfield coke ovens of the Tennessee Coal, Iron Railroad Co., and its new plants, the proposed new developments of the Gulf States Steel Co., the Kress store in Birmingham, the low rent housing projects in Birmingham, Memphis and other southern cities, the highway and bridge work in seven southern States, the new DuPont plant at Baton Rouge, new rayon additions at Rome, Ga., and Enke, N. C., the $5,600,000 Birmingham industrial water supply system, new post-offices and veteran's hospital additions, P.W.A. construction and many other projects have provided, or will provide, a very large amount of new steel business.

October road contracts of Alabama, Florida, Georgia and Mississippi will alone require more than 6000 tons of structural steel and more than 3000 tons of reinforcing bars.

On Oct. 28 bids will be opened in the U. S. Engineer Office, Mobile, for the new lock and dam on the Warrior River at Tuscaloosa, which is expected to cost around $3,000,000.

Contract for the new four-story building of S. H. Kress & Co., Birmingham, has been awarded to Day & Sachs, Birmingham. About 900 tons of structural steel will be required, the contract for which has been placed with Ingalls Iron Works Co.

Semet Solvay Co. is planning to reopen its Ensley plant and will supply about 800 tons of coke daily to the Tennessee Coal, Iron & Railroad Co. for a period of one year, pending the construction of the two new Fairfield batteries. Contract for these were awarded last week to the Koppers Co., Pittsburgh. The Ensley plant of the Semet Solvay Co. has been closed since June, 1932.

The blast furnace total remains at 12 and the open hearth at 13. Before the end of the week it is likely there will be an increase in open-hearth operations, on account of the resumption of the Ensley rail mill. It is expected that at least two additional open hearths will be added. Blast furnace production was increased on Oct. 15, as previously reported, when the Tennessee Coal, Iron & Railroad Co. blew in two more Ensley furnaces.

Fairfield Sheet Mill To Be Enlarged

BIRMINGHAM, Oct. 27. — Tennessee Coal, Iron & Railroad Co. announced today that additional facilities are to be installed at Fairfield sheet mill to provide an increase of 40,000 tons annually of hot-rolled sheet products. Work is to start at once.

. . . . NEW YORK. . . .

. . . Slightly easier situation prevails except in sheets.

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. . . No marked letdown in total activity is expected, however, this quarter.

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. . . Advance rollings of tin plate assure good operation to end of year.

NEW YORK, Oct. 27.—Although a somewhat easier situation prevails in all products except sheets, the change is no more than might have been expected after the heavy buying of September. Orders during October for most products have been in good volume considering the extent of coverage last month. The only marked decline in new buying is in structural steel, and orders for that product were larger last week than in either of the two previous weeks of this month. Not many sizable construction projects have been up for figuring during the past several weeks, but a good many on which bids have been submitted are still pending and definite action probably will not be taken until after election.

Nowhere in the sales division of the industry is there any expectation of a sharp letdown in activity during the remainder of the year. There may be a lessening of specifications for building construction, but manufacturing lines are holding up well and give promise of continuing to do so. Tin plate specifications for advance rollings are in sufficient volume to give the mills assurance of tin plate output at approximately its present rate during the remainder of the quarter.

Pig Iron

Buying for new account is inactive, but consumption continues strong in this district. A number of sellers state that customers are taking twice as much tonnage as was being shipped two to three months ago. As in other centers, the market's undertone reflects probable future strength. Furnaces stocks are at low levels and a winter shortage of iron is forecast for some sections at least. While production has been increased, this has applied to steelmaking grades, leaving foundry grades largely unaffected. Prices will probably be advanced by $1 to $2 a ton sometime after the election and after settlement of the steel wage situation.

REINFORCING STEEL

. . . Awards of 5500 tons —3040 tons in new projects.

AWARDS

Buffalo, 700 tons, Tifft Street viaduct, to Truscon Steel Co.

Cleveland, 200 tons, sewage disposal plant, to Patterson-Leitch Co.

State of Illinois, 100 tons, bridges, to unnamed bidders.

St. Louis, 350 tons, fermenting tanks for Anheuser-Busch brewery, to Laclede Steel Co.

Fort Lyons, Colo., 254 tons, construction of utilities for Veterans Administration Facility, to Mont J. Green, Manhattan, Kan.

Denver, 1645 tons, All-American Canal, to Columbia Steel Co. Colorado Fuel & Iron Co. entered a lower bid but could not meet the specified delivery.

Denver, 575 tons, All-American Canal, to Colorado Fuel & Iron Co.

Denver, 177 tons, All-American Canal, to Tennessee Coal, Iron & Railroad Co.

San Francisco, 118 tons, Alemany sewer system, to Soule Steel Co.

San Francisco, 1200 tons, furniture exchange at 10th and Market Streets, to Soule Steel Co.

Woodland, Cal., 502 tons, buildings for Spreckles Sugar Co., to Truscon Steel Co.

Los Angeles, 400 tons, Lincoln Park junior high school, to Concrete Engineering Co.

Los Angeles, 156 tons, bridge over Santa Ana River, to Soule Steel Co.

Los Angeles, 359 tons, channel cover and walls, to an unnamed bidder.

Huntington Park, Cal., 100 tons, store building at Pacific Avenue and Zoe Street.

Las Vegas, Nev., 167 tons, material for State underpass, to Truscon Steel Co.

Ketchikan, Alaska, 125 tons, post office, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

Flat Rock, Mich., 175 tons, foundation for roundhouse and machine shop, Detroit, Toledo & Ironton Railroad; W. H. Mueller, Detroit, general contractor.

Cleveland, 850 tons, Southerly sewage disposal plant; bids Oct. 29.

Chicago, 700 tons, Museum of Science and Industry; R. C. Wieboldt & Co., low bidders on general contract.

State of Indiana, 500 tons, highway work; Grace Construction Co., general contractor.

Denver, 895 tons, Pine River dam in southwestern Colorado; bids soon.

Los Angeles, 150 tons, school; bids opened.

Los Angeles, 195 tons, material for United States Treasury Department; bids opened.

Lincoln County, Mont., 152 tons, pony truss bridge; bids opened.

Roosevelt County, Mont., 116 tons, bridge; bids opened.

Quantity Deductions Are Changed

CARNEGIE - ILLINOIS STEEL CORP. has revised the set-up on quantity extras and deductions for hot-rolled, hot-rolled annealed, cold-rolled and long terne sheets and hot-rolled strip. The major change is in quantity deductions, which are now determined by the total weight of one grade and one analysis released at one time for shipment to one destination within a period of not exceeding 15 days; provided, however, that in the total weight on which the deduction is to apply there may be two or more sizes of not less than 25 tons of any one size.

Under the old system, the quantity deductions only applied on the total weight of one gage, size (size included width and length), grade, released for shipment at one time to one destination.

Under the new set-up a customer may order 150 tons of cold-rolled sheets and have two or more sizes included in the total weight, provided these sizes are ordered in

an amount of 25 tons or over and are the same grade and analysis in each case. Furthermore, the consumer would have 15 days in which to take shipment.

The amount of deductions and extras themselves as far as the weights are concerned have not been changed, nor has there been any change in arriving at quantity extras, which are still determined by the total weight of a size of one grade and one analysis released for shipment for one destination at one time. However, since the new size definition does not include length but only gage weight or thickness and width, it is now possible to order the same gage weight or thickness and width in different lengths and yet qualify for both quantity extras and deductions.

Roads and Bridges For Allegheny County

WASHINGTON, Oct. 27.—The Public Works Administration has approved a grant of $579,420 to the county of Allegheny, Pa., for a project estimated to cost $1,287,600, consisting of the construction of a highway, including three connecting bridges, in Baldwin and Snowden townships. The highway, known as the General Logan Boulevard, will be built of reinforced concrete and will be about 19,000 ft. long and 40 ft. wide. Two of the bridges will be of structural steel. Astructural steel truss bridge 800 ft. long and 40 ft. wide will span Lick Run. A small steel plate bridge 30 ft. long and 40 ft. wide will cross the Wabash & Pittsburgh Terminal Railroad.

NEMA Publishes Book On Arc Welding

THE National Electrical Manufacturers' Association, 155 E. 44th St., New York, has announced the publication of the NEMA Electric Arc-Welding Machine Standards. This new publication of NEMA is a reference work of practical information concerning the manufacture, test and performance of direct-current and alternating-current arc-welding machines such as motor-generator sets, dynamos, transformers, and rectifier arc-welding units. Because these standards represent standardized practice in the United States, they will assist in harmonizing practices in the industry and promote production economies. They also clear up many troublesome problems for the buyer of arc-welding equipment and define numerous terms which have hitherto been subject to various interpretations.

Copies of the standards, publication No. 36-37, may be obtained from the office of the association at 50c. each.

Luxemburg Output of Steel and Iron Gains

PRODUCTION of iron and steel in the Grand Duchy of Luxemburg during August was the largest recorded for any month during the current year, according to a report from Consul G. P. Waller, Luxemburg. Luxemburg's pig iron output in August, 1936, amounted to 169,968 tons compared with 161,898 tons in July and 153,858 tons in August, 1935. During the initial eight-month period of the current year, aggregate production of pig iron totaled 1,356,606 tons against 1,261,675 tons in the corresponding period of last year, it was stated. August steel ingot production at 164,350 tons compared with 162,317 tons in July and 148,804 tons in August, 1935. During the first eight months of 1936, 1,245,796 tons of steel ingots were produced compared with 1,243,862 tons in the corresponding 1935 period, statistics show.

DEMONSTRATION of use of MSA mask, described in THE IRON AGE of Oct. 15, page 246. Mask was developed by Navy Department's safety engineer, W. P. Biggs, in cooperation with Mine Safety Appliance Co., Pittsburgh, which holds commercial rights on mask. Mask now in use in various navy yards and is in stock at Brooklyn yard for issue in navy's industrial establishment. It has been used in the abrasive room of the Washington navy yard since last March and looking as good as new today mask has performed perfectly.

Field Discharge Switch

A MANUALLY operated field discharge switch for motor and generator field circuits, which is dead-front and mounted in back of the board, has been announced by the General Electric Co., Schenectady, N. Y. The new switch, Type LF-23, is rated 250 volts dc., 100 and 200 amp. only, double-pole, single-throw. Double-throw-switches are made up of two single-throw switches with mechanical interlock to prevent closing both throws at one time. The direct-operating mechanism and compact construction allow minimum panel front installation space. Tongue-type contacts with laminated blades provided with embossed line pressure contacts are used to assure efficient contact and low heating.

Small Press for Light Stamped Parts

FLEXO Machines, 2226 North Racine Avenue, Chicago, announce an automatic model 400, Flexopress, for the cutting of production materials to uniform lengths up to 9 in. Wire, light metal and other roll materials are fed by an automatic, built-in feed, having a positive locking device. For such light work as clips, connectors, spacers, etc., the design provides for simple dies. Adaptability also covers perforating operations on light metal, foil, etc. A four-speed drive provides a range of strokes from 6000 to 10,000 per hour.

TOWMOTOR, INC., manufacturer of material handling equipment, Cleveland, has appointed as representatives E. G. Artz, Inc., 534 North Jackson Street, Milwaukee; Carey Machinery & Supply Co., 119 East Lombard Street, Baltimore; Glen P. Crissman, 5680 12th Street, Detroit, and W. F. Weber, 2336 South Michigan Avenue, Chicago.

Jessop Steel Co., Washington, Pa., will afford their employees an opportunity of improving their technical knowledge of steel making at a series of classes to be conducted by the company two nights a week throughout the winter and spring months. Subjects in the course will deal with theoretical, physical and practical phases of steel manufacture.

. . . CLEVELAND . . .

. . . Ingot output higher in Cleveland-Lorain district.

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. . . New business in most products, however, is less active.

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. . . Deferred specifications from automobile companies being received.

CLEVELAND, Oct. 27.—Ingot output advanced two points to 84 per cent of capacity in the Cleveland-Lorain district this week, another open-hearth furnace being put on in Lorain, where both the open hearth and bessemer capacity now are operating at 100 per cent. In the valley district operations are unchanged at 76 per cent of capacity.

While demand for steel is holding up fairly well, the volume of new business is falling somewhat behind shipments, so that backlogs are being reduced. Sales exceeded shipments during September but the tonnage booked this month will be less than in September, while shipments will be larger than during last month.

Motor car manufacturers have deferred deliveries of some sheet tonnage because they did not get under good production on new models as soon as they had expected. However, with the stepping up of automobile schedules some of this suspended tonnage was released the past week and new sheet orders were placed by a few of the automotive plants. Miscellaneous demand for sheets continues good, particularly from refrigerator manufacturers. While the pressure for shipments has subsided, mills have not caught up much on sheet deliveries.

Miscellaneous demand for bars has improved, indicating that some consumers have about used up the large stocks they purchased in September before the price advance. Manufacturers' wire is moving fairly well, but other wire products are quiet. Mills have about finished shipping the semi-finished steel, mostly in sheet bars, that was ordered in September before the price advance. Non-integrated sheet mills put in large stocks, but when these are used up they will feel the effects of a narrowed margin between sheet bars and sheets unless sheet prices are advanced for the coming quarter. Pressure against an advance in sheet prices is already being exerted by automobile manufacturers, who point out that prices estabilshed for their 1937 models are based on present steel prices. Some automobile manufacturers, with the offer of attractive tonnages, also are trying to beat down present sheet prices.

New demand for steel from railroads is slack, although some tonnage is in prospect for car repair work.

Pig Iron

With nearly all consumers under cover for the remainder of the year, the buying movement has subsided rather sharply. Shipments in October will equal or be slightly in excess to those in September. As automobile foundries are starting to take iron in increased quantities, shipments in November are expected to exceed those of this month. Foundries are ordering more forward iron than has been the case for some time. The supply of merchant iron is plentiful, but producers see a possibility that it will tighten up a little later.

Sheets

Demand has slackened somewhat. This is largely because automobile companies have been slower in getting under good production on new models as soon as they had expected. With the stepping up in automobile production some new business came from that source the past week and some tonnage which had been held up was released. While October shipments gained over September, bookings this month will show some decrease from last month. Mills generally are comfortably filled with orders for several weeks and a local producer has withdrawn entirely from the market, having sold his entire output for the remainder of the year. Galvanized sheets are experiencing a seasonal restriction in demand, both from jobbers and from manufacturers of farm equipment.

Strip Steel

Demand is steady and in good volume both for hot and cold material. The great bulk of the tonnage is coming from automobile manufacturers and parts makers. Deliveries of hot-rolled strip have improved somewhat, but they are no better on cold rolled material, several mills not promising shipments in less than six weeks.

Bolts and Nuts

Orders so far this month have been lighter than in September, but shipments are heavier than last month. Shipments against orders placed by motor car manufacturers a few weeks ago have increased. Demand from railroads has improved and miscellaneous business continues good.

Bars, Plates and Shapes

Demand for bars is slowly expanding, as consumers are getting their stocks used up that were purchased before the fourth quarter price advance. New business is coming in better volume from miscellaneous sources than from the automotive field. Practically all the third quarter orders have now been filled and some mills are able to make deliveries in from two to three weeks on new orders. Structural shapes and plates are quiet. Awards and inquiries for fabricated steel are light, the only awards during the week being for two industrial plants taking 210 tons. Cleveland will take bids Thursday for a sewage disposal plant requiring 850 tons of reinforcing bars.

Production of white-base antifriction bearing metals in September totaled 2,654,161 lb., as compared with 2,494,757 lb. in August, according to the Bureau of Census. Output in the first nine months of the current year aggregated 21,377,007 lb., as against 16,603,269 lb. in the corresponding period of last year.

. . . Pipe jobs require 71,000 tons of plates.

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. . . Bids opened on large Federal building.

SAN FRANCISCO, Oct. 26.—Pipeline projects accounted for a large portion of the Pacific Coast steel activity last week with two major pipeline awards in the Northwest accounting for 7100 tons of steel plates. At Aberdeen, Wash., 2700 tons of 54-in. pipe, to be used in the construction of a water supply line to Hoquiam, was awarded to the Federal Pipe & Tank Co. Salem, Ore., awarded 4400 tons of 30 and 36-in. pipe, for use in a $6,000,000 water supply project, to American Concrete & Steel Pipe Co. The Board of Water Commissioners of Denver will open bids Nov. 10 on approximately 3900 tons of 30, 36, 51, 57, and 63-in. steel pipe to be used in the construction of Conduit No. 17. U. S. Pipe & Foundry Co. is low on 1200 tons of cast iron pipe for the East Bay municipal district in Oakland.

Bids were opened in Los Angeles on the proposed $6,250,000 Federal building, though no award has been announced. Only two companies submitted bids on the general contract for this combined postoffice and jail. George A. Fuller Co., Washington, D. C., was low bidder. The project calls for 20,000 tons of structural steel and approximately 6000 tons of reinforcing bars. Formal award is expected within the next two weeks.

Leading the reinforcing steel market for the last week was the award of 1200 tons of bars for the construction of a furniture exchange at 10th and Market Streets in San Francisco to Soule Steel Co. Aggregate bar awards for the week amounted to 4837 tons, of which Soule Steel Co. took 1650 tons. Structural steel projects were few and small.

Newspaper headlines have alternated "new hope for dock labor settlement" with "hopes for settlement blocked" during the past frantic week of work by Government arbitrators to maintain peace between ship owners and longshoremen. It is impossible to predict at this time what the outcome will be when the twice-extended 1934 agreement expires again next week. In the meantime steel movements have remained sluggish awaiting the outcome. In spite of the past month's comparative inactivity mill production and orders for 1936 remain far above the 1935 level.

. . . Pig iron users are buying more heavily.

o o o

. . . Melt continues at a high rate.

ST. LOUIS, Oct. 27.—Anticipating an increase in the price of pig iron during the quarter, some melters have been buying additional tonnages during the past week. In other cases, melters several weeks ago began to contract for a greater tonnage than they could use during the fourth quarter, unless there was an increase in business far beyond their expectations, in the belief that higher prices would prevail before the turn of the year. One of the large makers is discouraging any buying movement based on an increase in prices this year.

The melt in the St. Louis trade territory continues at a high rate. Reports from the agricultural implement industries are that operations have been stepped up considerably during the last two weeks, with the prospect for a steady increase in operations. The tractor industry's operations are so heavy that it is using outside foundries to supplement its own plants, which are working on three shifts to supply the demand. The stove foundries are going full.

The demand for nearly all lines of finished iron and steel is not so brisk as it has been. Specifications for structural shapes have fallen off quite a bit. Consumption of wire products on farms has not yet reached the point where jobbers are reordering.

Laclede Steel Co. has been awarded 350 tons of reinforcing bars for fermenting tanks for a local brewery. Mississippi Valley Structural Steel Co. has been awarded 125 tons of structural shapes for a warehouse for the Federal Barge Line here.

Providence has awarded 1200 tons of 6 to 12-in. pipe to United States Pipe & Foundry Co.

Toledo, Ohio, plans 16,270 ft. of 48-in., with 120 ft. of total, 54-in., for new force pipe line for water system; also pumping station, with two motor-driven pumping units of 25,000,000-gal. per day capacity, and accessory equipment. Cost $686,794, of which $309,057 is being secured through Federal grant.

Anna, Ill., will take bids soon for pipe for water system and other waterworks installation, including filtration plant and pumping station. Bids received on previous call have been rejected. Fund of $112,900 has been secured through Federal aid. Warren & Van Praag, Decatur, Ill., are consulting engineers.

Kingfisher, Okla., plans about 5000 ft. of 40-in. for main water line. W. H. Sindt, Enid, Okla., is consulting engineer.

Bellaire, Tex., plans 41,000 ft. of 2, 6 and 8-in. for water system; also 100,000-gal. elevated steel tank and tower. Bond issue of $60,000 has been voted for project. Garrett Engineering Co., Houston, Tex., is consulting engineer.

Mooringsport, La., plans pipe lines for water system. Cost about $35,000 with other waterworks installation. Huey & Gage, Monroe, La., are consulting engineers.

Benton, Ark., has called special election Nov. 10 to approve bonds for $26,000 for pipe lines for water system and other waterworks improvements. R. E. Williams, Little Rock, Ark., is consulting engineer.

Topeka, Kan., plans pipe lines for water system in Highland Park district. Cost about $220,000. Financing is being arranged through Federal aid. Charles A. Haskins, Finance Building, Kansas City, Mo., is consulting engineer.

Golden, Colo., plans about 10,000 ft. of 4-in. for water system. Fund of $16,000 has been secured through Federal aid. A. E. Jones, mayor, is in charge.

Syracuse, Utah, is arranging fund of $52,727 through Federal aid for pipe lines for water system and other waterworks installation. R. G. Harding, Bountiful, Utah, is consulting engineer.

Albuquerque, N. M., has opened bids on 130 tons of 4-in.

Jackson, Cal., has opened bids on 134 tons of 8, 10 and 12-in. pipe for sewage system.

Oakland, Cal., East Bay Municipal District, has opened bids on 1200 tons of 4 to 16-in.; United States Pipe & Foundry Co. is low bidder.

Redondo Beach, Cal., plans about 295,000 ft. of 4 to 12-in. and 5000 ft. of 16-in. for water system; also 3,000,000-gal. steel storage tank in southern part of city, 500,000-gal. steel storage tank in northern part of city, and two elevated steel storage tanks and towers, 250,000-gal. and 50,000-gal., respectively; booster pumping stations and other waterworks installation. Cost $535,000, of which about $273,000 will be secured through Federal aid and remainder through municipal bond issue. H. Kirk Kellogg, 427 North Hobart Boulevard, Los Angeles, is consulting engineer.

Willapa, Wash., plans pipe lines for water distribution in local districts, including East Reynolds and Menlo, divided into cast iron, steel and wood pipe in various quantities. Fund of $69,091 has been secured through Federal aid. Burwell Bantz, Chehalis, Wash., is consulting engineer.

. . PHILADELPHIA . .

. . . New business has decreased slightly.

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. . . Alan Wood's new hot mill to begin operations Nov. 9.

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. . . Operations remain at 55½ per cent of capacity.

PHILADELPHIA, Oct. 27.—A tapering of orders in nearly all lines, with the possible exception of sheets, was reported this week, and consumers seem to be withholding their heavy specifications until after election, whether the outcome seriously concerns them or not. Backlogs in most products are unchanged, although even fewer plate orders are on hand than last week, when some district mills were able to promise deliveries in one week. Operations are unchanged at 55½ per cent of capacity and there has been no noticeable lessening in the feeling of optimism which has been expressed among sellers concerning business for the remainder of the year.

The shortage of semi-finished steel, which was forecast for about this time if business continued good, has not materialized. One large producer can deliver sheet bars in three weeks, while in some mills, which produce mostly for their own use, consumption is about equaling output. Rerolling mills appear to be obtaining all necessary material.

A considerable increase in district finishing capacity will be made Nov. 9, when the first unit of the new Alan Wood hot sheet mill will be started up, with the second unit due to follow in a few weeks. This mill is expected to provide the company with a decided advantage where sheet deliveries are concerned, since the smallest backlog of any company on this product is from three to four weeks at the present time.

Orders for 1937 tin plate have not yet been received here, but they are expected shortly; meanwhile, new business is tapering somewhat, although a spurt is looked for in a month or so.

One of the largest district warehouses reports a good volume of business, with demand running from 5 to 10 per cent higher than at this time in September.

New bids have been asked by the recently appointed Maritime Commission for the United States Lines' proposed vessel, which will require around 15,000 tons of hull steel.

Pig Iron

Consumption is steady. The majority of customers have covered by contract to the end of the year. A price increase is considered likely by some soon after election. Competition from foreign iron appears to be easing a bit, since the pig iron situation in England is once more serious, and consumers there are taking a great part of the Russian and Dutch output.

Sheets and Plates

Sheet specifications continue heavy and backlogs are about the same as last week. A slight decrease has been noticeable in galvanized, which can now be delivered in three to four weeks. Consumers may be able to secure quicker deliveries next month when one unit of the Alan Wood hot mill is placed in operation, but reports from the Detroit office of one major steel company indicate that the automobile industry is anticipating a greater year in 1937 than in 1929, which may mean that the heavy demand from that source will again lengthen delivery schedules. Plates have again fallen off and one mill is delivering in three to four days and expects about two more weeks of inactivity in the market. Another district mill whose plate backlog is low states that it will require about three weeks' rolling to replenish stock which was depleted badly by the relatively heavy demand of a few months ago. Pusey & Jones Corp., Wilmington, was low bidder on a Government mine layer requiring 375 tons of plate. Bids were taken last week on two Chesapeake & Ohio barges, each to take 180 tons of plates. No announcement has been made as to the outcome of the bidding on the Pennsylvania car floats.

Wire

Specifications were light this week. Mills are now occupied with the task of signing up jobbers' agreements which state the amounts of wholesale and retail sales so that eligibility to receive jobber discounts may be ascertained.

Shapes and Bars

Structural awards were unimpressive this week. Belmont Iron Works received 138 tons of shapes for a storage building at Lakehurst, N. J. Several State highway job bids were rejected and will be taken again Oct. 30, while 150 tons of shapes for a crossing elimination at Absecon, N. J., will be bid on today. A Philadelphia warehouse job, which was to have required about 700 tons of reinforcing bars, may not be settled for several months, while a Luzerne County viaduct, which requires 400 tons of bars, may be rebid.

Imports

The following iron and steel imports were received here last week: 1500 tons of chrome ore from British South Africa; 950 tons of pig iron from British India; 197 tons of pig iron and 6 tons of drill steel from Norway; 100 tons of ferromanganese from the Netherlands; 5 tons of ferromanganese, 9 tons of steel billets, 3 tons of cold drawn steel wire and 3 tons of steel forgings from Sweden; 17 tons of steel bars and 31 tons of structural shapes from France; 162 tons of steel bars, 5 tons of steel hoops, 28 tons of steel bands and 171 tons of structural shapes from Belgium.

. . . CINCINNATI . . .

. . . Pig iron melt and buying show gains.

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. . . Sheet purchases still at good rate.

CINCINNATI, Oct. 27. — Pig iron purchasing for fourth quarter has averaged about 2100 tons a week during the past month. This is a sharp increase over previous levels and, since melters are not buying for inventory, reflects the substantial melt. The trade anticipates a

price advance after election. Except for a 200-ton Southern iron order from an Indiana melter, contracts the past week called for single carloads up to 150-ton lots. Foundry operations have increased to about 75 per cent of capacity.

Sheet mill backlogs mount as weekly ordering exceeds capacity output. Automotive ordering is at full stride and accounts for about one-third of the district demand. General sheet ordering is steadily expanding, forcing mills to defer delivery dates almost daily. In fact, spot deliveries on standard galvanized grades are next to impossible. The leading interest in the district reports capacity schedules for the next three weeks with probability of continuance into the new year.

Ingot production this week will equal the year's peak with 32 out of 34 open hearths in operation. Output of furnaces is being used almost exclusively on light rolled materials.

Mill backlogs are a boon to warehouses, consumers turning to jobbers for sheets and bars needed immediately.

....BUFFALO....

. . . Pig iron shipments in good volume.

o o o

. . . Steel mill activity is unchanged.

BUFFALO, Oct. 27. — Extensive specifying against pig iron contracts is proceeding, with all classes of foundries taking iron freely. Not much new business is cropping up, but the volume of shipments is most satisfactory to producers. One improvement noted in this district is the increased activity of makers of oil well machinery in the Pennsylvania fields. The list of active blast furnaces is: Bethlehem's Lackawanna plant, 5; Republic Steel Corp., 2; Hanna Furnace Corp. 3; Tonawanda Iron Works, 1, and Wickwire-Spencer Steel Co., 1.

Open-hearth activity is unchanged, with Bethlehem operating 22; Republic, 7, and Wickwire-Spencer, 2.

Structural fabricating shops are busy and considerable small-lot business is being offered. This is true of reinforcing bar makers also. The principal commitment of the week was a 700-ton reinforcing contract in connection with the Tifft Street viaduct, the job being taken by a Buffalo maker.

RAILROAD BUYING

Kansas City Southern has bought 10 2-10-4 locomotives from Lima Locomotive Works, 450 box cars, and 50 Corten steel box cars from Pullman Standard Car Mfg. Co., and 300 box cars from General American Tank Car Corp.

Western Pacific is inquiring for 50 flat cars and 100 ballast cars, all 50 tons' capacity.

St. Louis Southwestern has ordered 50 steel underframes for flat cars from American Car & Foundry Co.

Bureau of Supplies and Accounts, Navy Department, Washington, has taken bids on two 70-ton flat cars.

Kennecott Copper Corp. has ordered 250 100-ton ore cars from Pressed Steel Car Co. These cars will be built of copper alloy, high-tensile steel and are for use in mining operations in Utah.

Denver & Rio Grande will buy 10 freight and five passenger locomotives for 1937 delivery.

American Car & Foundry Motors Co., has received the following orders for motor coaches, all powered with Hall-Scott horizontal engine: 15 for Capital Transit Co., Washington; two for Warwick Coach Lines, Inc., Malden, Mass.; one for Plymouth & Brockton Street Railway, Plymouth, Mass.; three for Boston, Worcester & New York Street Railway Co., Framingham, Mass., and four for Santa Fe Railroad for operation over San Francisco-Oakland Bay project.

J. G. Brill Co. has received an order from Shreveport Railways Co., Shreveport, La., for two 40-passenger Brill trackless trolleys, supplementing a recent order for seven such units.

RAILS AND TRACK SUPPLIES

Chicago & Northwestern will buy 48,500 tons of rails in addition to necessary accessories.

. . .BOSTON. . .

. . . Scrap prices lower by 50c on some grades.

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. . . Foundrymen taking pig iron more freely.

BOSTON, Oct. 27. — Reflecting the lower price range for scrap in the Pittsburgh market, there was a shading of prices for most items in this line during the past week in the local market. The average ranged about 50c. a ton for the half dozen lines that were affected. There has not been very much business in scrap for the past few weeks, owing to the Pittsburgh mills not taking on much material, and other users have been quite sufficiently supplied for the time being.

Structural lines went through another quiet week, which to some extent was attributed to the approach of the election, after which it was felt a little better situation would develop. The only contract worthwhile was the awarding of 450 tons for an addition to the Ford plant at East Somerville, Mass., which went to the Mahon Steel Co., Detroit. A fair amount of small business has been going on, but major projects are slow in getting into actual orders.

Pig iron continues to move in car and less than carlots in fair total. Foundrymen are said to be far more receptive than was the case a month or two ago and do not hesitate to place moderate orders, feeling that they would rather have the iron in their yards any time from now on as the winter season is approaching. It was estimated that probably 1000 tons was sold in the past week.

There were a few very moderate price adjustments in warehouse lines during the week, but these largely were to bring items into line with existing conditions. Materials have been moving slowly from warehouses, but the feeling is that after the turn of the month a more liberal buying policy will be found.

Considerable small business continues to find its way into cast iron pipe makers. In fact, this has been the mainstay of New England sales interests during the past several weeks. In the aggregate it is said the tonnage foots up substantially. Providence opened bids Oct. 26 on 1200 tons of various sizes.

Foundrymen to Hold Conference in Iowa

THE American Foundrymen's Association will hold a convention for foundrymen of western Illinois, Missouri and Iowa on Oct. 30 and 31 at Iowa City, Iowa. The two-day conference will include a series of sessions presenting an unusually attractive group of speakers. Talks on sand control and a demonstration of sand control methods will be followed by discussions of testing cast metals and papers on cupola practice.

The following day will feature sessions relating to alloy cast iron, non-ferrous foundry practice, and electric furnace and rotary furnace practice of melting cast iron. The speaking rostrum includes a list of names of prominent members of the industrial and academic fields.

. . .NON-FERROUS. . .

. . . Domestic copper advances to 10c.; lead prices rise $2 a ton.

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. . . Tin moderately active; strong undertone in zinc.

NEW YORK, Oct. 27.—Copper producers advanced the price of electrolytic for domestic consumption to 10c. a lb., Connecticut Valley, yesterday when it became evident that the demand was gathering strength. The added stimulus of a higher market caused a buying wave to develop yesterday which witnessed 84,500 tons of new copper placed under contract. This raised the month's total to 145,026 tons. While most sellers allowed consumers to cover ahead through the close of business yesterday at the old 9.75c. level, a quantity of 10c. metal figured in the trading. The new price, marking the first advance since July last, had been anticipated for quite some time, but had been delayed by a conservative faction in the market. While the advance here was in process of taking place, foreign copper producers announced a rise in world production quotas to 95 per cent. This had the effect of depressing quotations on the London Metal Exchange, but did not generally influence European markets which continue to take export material at about 10.15c. a lb., c.i.f. usual base ports.

Lead

Heavy demand for pig lead in the open market this week has resulted in a higher price for the metal, effective today. The market has uniformly advanced to 4.70c. a lb., New York basis, but St. Joseph Lead Co. continues to demand a $1 a ton premium so that its price is 4.75c. Both St. Joe and the Smelting Co., however, are asking 4.55c. a lb., St. Louis. At the higher level inquiry is said still to be strong, with the bulk of the demand for November shipment. All last week, however, October purchases were felt. Books for December delivery will be opened late this week. The excellent September statistics showed a decrease in smelters' stocks of refined lead of 17,700 tons. Shipments rose to 50,700 tons, and production declined to approximately 32,900 tons.

Tin

Miscellaneous inquiry for tin for scattered positions resulted in a moderate volume of business last week. Prices showed no distinct trend, as the buying tended to be steady from day to day. Leading interests in the market feel that the question of Siam's signing of the restriction agreement has now been somewhat discounted. They point out that a tin shortage still exists although quotas are at 90 per cent, and that, in justice, it would perhaps be wisest to raise these to 100 per cent. The New York price for spot Straits today is 44.00c. a lb. London prices are £198 10s. standard cash and £197 three-months. The Eastern quotation is £200 10s.

Zinc

Buying continued on a fairly active scale last week, with sales in excess of 6000 tons. Shipments again were above 5000 tons. While activity in copper and lead has somewhat overshadowed this market momentarily, there is indication that the situation may change later on. The fundamentally strong position of the metal coupled with higher prices abroad have not been overlooked by domestic users as shown by recent expansion in demand. An advance in the price is believed to be pending.

The Week's Prices. Cents Per Pound for Early Delivery

	Oct. 21	Oct. 22	Oct. 23	Oct. 24	Oct. 26	Oct. 27
Electrolytic copper, Conn.*	9.75	9.75	9.75	9.75	9.75	10.00
Lake copper, N. Y.	9.87½	9.87½	9.87½	9.87½	9.87½	10.12½
Straits tin, Spot, New York	44.10	43.95	44.20	....	44.00	44.45
Zinc, East St. Louis	4.85	4.85	4.85	4.85	4.85	4.85
Zinc, New York†	5.22½	5.22½	5.22½	5.22½	5.22½	5.22½
Lead, St. Louis	4.45	4.45	4.45	4.45	4.45	4.55
Lead, New York	4.60	4.60	4.60	4.60	4.60	4.70

* Delivered Connecticut Valley; price ¼c. lower delivered in New York.
† Includes emergency freight charge.

Aluminum, virgin 99 per cent plus 19.00c.-21.00c. a lb. delivered.
Aluminum, No. 12 remelt No. 2 standard, in carloads, 16.50c. a lb. delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 12.50c. a lb., New York.
Quicksilver, $88.00 to $92.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 9.75c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	45.25c. to 46.25c.
Tin, bar	47.25c. to 48.25c.
Copper, Lake	11.00c. to 12.00c.
Copper, electrolytic	11.00c. to 12.00c.
Copper, castings	10.75c. to 11.75c.
*Copper sheets, hot-rolled	17.50c.
*High brass sheets	15.62½c.
*Seamless brass tubes	17.87½c.
*Seamless copper tubes	18.00c.
*Brass rods	13.62½c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	5.10c. to 6.10c.
Lead, bar	6.10c. to 7.10c.
Lead, Sheets, cut	8.25c.
Antimony, Asiatic	13.00c. to 14.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.50c. to 20.00c.
Solder, ½ and ½	28.50c. to 29.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

* These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 33⅓ per cent allowed off for extras, except copper tubes and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	48.37½c.
Tin, Bar	50.37½c.
Copper, Lake	10.75c. to 11.00c.
Copper, electrolytic	10.75c. to 11.00c.
Copper, castings	10.50c. to 10.75c.
Zinc, slabs	6.50c. to 6.75c.
Lead, American pig	5.20c. to 6.50c.
Lead, bar	8.50c.
Antimony, Asiatic	15.00c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	52.37½c.
Solder, ½ and ½	26.25c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.62½c.	8.37½c.
Copper, hvy. and wire	7.50c.	8.00c.
Copper, light and bottoms	6.50c.	7.00c.
Brass, heavy	4.37½c.	5.00c.
Brass, light	3.62½c.	4.37½c.
Hvy. machine composition	6.37½c.	6.87½c.
No. 1 yel. brass turnings	5.37½c.	5.87½c.
No. 1 red brass or compos. turnings	6.00c.	6.50c.
Lead, heavy	3.62½c.	4.00c.
Sheet aluminum	13.25c.	14.75c.
Zinc	2.50c.	2.87½c.
Cast aluminum	12.12½c.	13.25c.

IRON AND STEEL SCRAP

. . . Slight decline at Pittsburgh drops composite to $16.50 a gross ton.

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. . . Buffalo very active as canal shipments are delayed.

A GENERAL disinclination of mills to enter new orders at Pittsburgh has resulted in a slight price reaction there, which, in turn, has lowered the country's composite scrap average to $16.50 a gross ton, as compared with $16.58 a week ago. An examination of reports from major markets will show that despite a slight downward drift in the composite price during the past fortnight, there is no indication of widespread market weakness. On the contrary, many holders of large accumulations are seemingly confident that better prices will develop as winter weather interferes with transportation and collection.

High prices in the domestic market continue to discourage export transactions. Consequently, activity at principal ports such as New York and Boston continues to languish.

Pittsburgh

The same consuming interest which recently purchased No. 1 steel at $17.75 bought additional supplies early last week at the same figure, and the aggregate tonnage contracted for at this price represents a substantial amount. Within the past week a moderate sized transaction into consumption brought $17.50 for No. 1. This latter sale together with the fact that brokers are obtaining steel at $17 and $17.25 make the market quotable at $17.25 to $17.75 for No. 1, a reduction of 25c. since last week. Most large consumers in this district are either holding up shipments or have limited the amount of incoming supplies, and there is little chance that the market will show much activity over the next few weeks. Meanwhile, there is no evidence of any drastic weakness, and the recent softness is attributable more to the lack of purchases than to any other factor.

Chicago

Weakness in other markets has had no bearing on Chicago prices as brokers continue to pay $16.50 for tonnage lots of industrial heavy melting steel and as high as $16.80 for the railroad grade. Unfilled orders to mills are large and sellers still need sizable tonnages to cover old commitments. Specialty users are again entering the market and borings and turnings are moving in quantity from Chicago docks. Several cargoes of scrap have come to Chicago mills from production centers in Michigan.

Cleveland

The local market has not been influenced by price concessions in the Pittsburgh district. Blast furnace scrap has advanced 25c. a ton, dealers now paying as high as $11.25 for that grade, while machine shop turnings, which have become scarce, have also advanced 25c. Brokers advanced quotations on these grades during the week to bring out scrap to fill outstanding orders. Other grades are firm at recent quotations. Many producers and dealers are holding their scrap for better prices and as a result the supply is far from plentiful. Heavy shipments of scrap are coming to Cleveland by water from various Lake ports, the approaching close of navigation stimulating Lake shipments.

Philadelphia

The market continues to be quiet. No sales of consequence have been reported, but prices are quite firm. Brokers continue to offer $15.50 for No. 1 steel, although no sales at this price have been made for a week or 10 days. Mills are buying steadily but in small quantities, and at least one has built up a fairly large scrap pile for the winter. The market appears to be settling down to a stable price at the moment, but opinion is that when there is a change it will be upward.

Buffalo

Shortage of boats on the barge canal has disrupted the scrap buying policy of local mills. These users have bought heavily down-state, but the demand for bottoms for transportation of Argentine corn, iron ore and pig iron, has resulted in deliveries being held up at a time when the mills can ill afford to run into a shortage of old material. The result is that the melters are turning to the local dealers for the first time in many weeks, and one important user has put out one of the largest inquiries ever circulated to Buffalo dealers. The offering price is $16 and $14.50 for No. 1 and No. 2 steel respectively, but no important sales have been made, because dealers can get this much for carload lots and are averse to going short with material scarce Dealers say no tonnage is available under $17 or at least $16.50. Cupola cast is in heavy demand and important sales have been made at this area.

New York

Steel mill grades are reduced in price this week for the first time in over a month, the market having reacted to liberal supplies and expanding flow of material to consumers, sufficient in some cases as to have caused physical difficulties in handling at mill yards. Consequently New York dealers are paying 25c. less for No. 1 steel which is now quoted at $11.50 to $12, while No. 2 steel is bringing $10.25 to $10.75, a decrease of 50c. a ton. Heavy breakable cast has also been lowered 50c. Export business is desultory, and, with buyers on the other side showing almost no interest in American contracts, export quotations have eased.

Detroit

The market shows further signs of weakness. Pincipal grades, with the exception of blast furnace types for water shipment have fallen off 25c. There has been practically no local mill buying, and large automotive lists will not be closed until the end of the week. The local section of the Scrap Institute, in attempting to stop pilferage of scrap from cars in transit, is offering $600 reward for conviction of a buyer of stolen scrap. Luria Brothers is leasing Pursglove Coal Dock at Superior, Wis., for a scrap sorting yard. This broker will tap supplies as far west as the Rocky Mountains and has already accumulated approximately 40,000 tons at this water shipping point.

St. Louis

Prices in this area advanced last week from 25c. to 75c. a ton owing to efforts of dealers to cover short interests, which are still said to be heavy. Supplies in hands of dealers are reported to be drying up, and offerings by railroads are very light. The steel mills in the district are said to be willing to take additional tonnages, but offerings are scarce.

Cincinnati

Activity in the old materials market is limited to dealer purchases to bolster stocks or to cover old commitments. Mill lethargy toward buying is explained by imminence of the election. However, the trade is preparing for a brisk market following the first part of November. Prices are unchanged and the tone is firm.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$17.25 to $17.75
No. 2 hvy. mltng. steel.	15.25 to 15.75
No. 2 RR. wrought.....	17.25 to 17.75
Scrap rails	17.75 to 18.25
Rails, 3 ft. and under..	20.00 to 20.50
Comp. sheet steel	17.25 to 17.75
Hand. bundled sheets..	16.25 to 16.75
Hvy. steel axle turn...	15.75 to 16.25
Machine shop turn....	12.00 to 12.50
Short shov. turn.....	12.00 to 12.50
Mixed bor. & turn.....	11.50 to 12.00
Cast iron borings	12.50 to 13.00
Cast iron carwheels...	17.00 to 17.50
Hvy. breakable cast...	14.50 to 15.00
No. 1 cast	16.00 to 16.50
RR. knuckles & cplrs.	20.50 to 21.00
Rail coil & leaf springs	20.50 to 21.00
Rolled steel wheels....	20.50 to 21.00
Low phos. billet crops.	21.00 to 21.50
Low phos. sh. bar....	20.50 to 21.00
Low phos. punchings..	20.00 to 20.50
Low phos. plate scrap.	20.00 to 20.50
Steel car axles	19.50 to 20.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.00 to $15.50
No. 2 hvy mltng. steel.	14.00 to 14.50
Comp. sheet steel	14.50 to 15.00
Light bund. stampings	11.00 to 11.50
Drop forge flashings..	14.00 to 14.50
Machine shop turn....	10.50 to 11.00
Short shov. turn.....	11.00 to 11.50
No. 1 busheling	14.00 to 14.00
Steel axle turnings....	11.00 to 11.50
Low phos. billet crops	19.00 to 19.50
Cast iron borings	10.75 to 11.25
Mixed bor. & turn....	10.75 to 11.25
No. 2 busheling	10.75 to 11.25
No. 1 cast	16.75 to 17.25
Railroad grate bars...	9.00 to 9.50
Stove plate	9.00 to 9.50
Rails under 3 ft.	19.00 to 19.50
Rails for rolling	16.50 to 17.00
Railroad malleable ...	17.75 to 18.00
Cast iron carwheels...	.... 15.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$15.50 to $16.00
No. 2 hvy. mltng. steel.	14.00 to 14.50
Hydraulic bund., new..	15.00 to 15.50
Hydraulic bund., old..	12.50 to 13.00
Steel rails for rolling..	17.00 to 17.50
Cast iron carwheels..	16.50 to 17.00
Hvy. breakable cast...	15.50 to 16.00
No. 1 cast	16.50 to 17.00
Stove plate (steel wks.)	12.50 to 13.00
Railroad malleable ...	.... 16.50
Machine shop turn....	9.50 to 10.00
No. 1 blast furnace....	8.50 to 9.00
Cast borings	8.00 to 8.50
Heavy axle turnings..	12.50 to 13.00
No. 1 low phos. hvy...	20.00 to 20.50
Couplers & knuckles...	19.50 to 20.00
Rolled steel wheels....	19.50 to 20.00
Steel axles	20.50 to 21.00
Shafting	20.50 to 21.00
No. 1 RR. wrought....	16.00 to 16.50
Spec. iron & steel pipe.	13.50 to 14.00
Bundled sheets	14.00 to 14.50
No. 1 forge fire.....	14.50 to 15.00
Cast borings (chem.).	10.50 to 13.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel.....	$16.00 to $16.50
Auto. hvy. mltng. steel.	14.00 to 14.50
Shoveling steel	16.00 to 16.50
Hydraul. comp. sheets.	15.00 to 15.50
Drop forge flashings..	13.50 to 14.00
No. 1 busheling	14.75 to 15.25
Rolled carwheels	18.00 to 18.50
Railroad tires, cut	18.00 to 18.50
Railroad leaf springs..	17.50 to 18.00
Axle turnings	15.00 to 15.50
Steel coup. & knuckles	18.00 to 18.50
Coil springs	19.00 to 19.50
Axle turn. (elec.)	16.00 to 16.50
Low phos. punchings..	18.75 to 19.25
Low phos. plates, 12 in. and under	18.75 to 19.25
Cast iron borings	9.50 to 10.00
Short shov. turnings..	10.50 to 11.00
Machine shop turn....	8.50 to 9.00
Rerolling rails	17.00 to 17.50
Steel rails under 3 ft...	17.00 to 17.50
Steel rails under 2 ft...	18.50 to 19.00
Angle bars, steel	18.00 to 18.50
Cast iron carwheels ..	16.50 to 17.00
Railroad malleable	18.50 to 19.00
Agric. malleable	.... 15.00
	Per Net Ton
Iron car axles	$18.50 to $19.00
Steel car axles	17.75 to 18.25
No. 1 RR. wrought.....	14.25 to 14.75
No. 2 RR. wrought....	$14.25 to $14.75
No. 2 busheling, old...	6.00 to 6.50
Locomotive tires	13.00 to 13.50
Pipes and flues	8.50 to 9.00
No. 1 machinery cast..	14.00 to 14.50
Clean auto. cast.....	13.00 to 13.50
No. 1 railroad cast....	13.50 to 14.00
No. 1 agric. cast	11.00 to 11.50
Stove plate	8.75 to 9.25
Grate bars	9.50 to 10.00
Brake shoes	10.50 to 11.00

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng. steel.	$16.00 to $16.50
No. 2 hvy. mltng. steel.	14.50 to 15.00
Scrap rails	16.00 to 16.50
New hy. b'ndled sheets	14.50 to 15.00
Old hydraul. bundles ..	13.00 to 13.50
Drop forge flashings ...	14.50 to 15.00
No. 1 busheling	14.25 to 15.00
Hvy. axle turnings....	10.50 to 11.00
Machine shop turn....	9.50 to 10.00
Knuckles & couplers..	18.50 to 19.00
Coil & leaf springs....	18.50 to 19.00
Rolled steel wheels....	18.50 to 19.00
Low phos. billet crops.	18.50 to 19.00
Short shov. turnings..	9.75 to 10.25
Mixed bor. & turn.....	9.75 to 10.25
Cast iron borings	9.75 to 10.25
No. 2 busheling	11.00 to 11.50
Steel car axles	17.00 to 17.50
Iron axles	12.00 to 12.50
No. 1 machinery cast..	15.00 to 15.50
No. 1 cupola cast	14.50 to 15.00
Stove plate	12.50 to 13.00
Steel rails under 3 ft..	17.50 to 18.00
Cast iron carwheels...	15.50 to 16.00
Railroad malleable	17.00 to 18.00
Chemical borings	10.50 to 11.00

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel.....	.... $11.50
Scrap steel rails	$12.00 to 12.50
Short shov. turnings..	.... 8.00
Stove plate	.... 8.00
Steel axles	13.50 to 14.00
Iron axles	13.50 to 14.00
No. 1 RR. wrought....	8.50 to 9.00
Rails for rolling	13.50 to 14.00
No. 1 cast	.... 12.50
Tramcar wheels	.... 12.00

ST. LOUIS

Dealer's buying prices per gross ton delivered to consumer:

Selected hvy. steel....	$15.00 to $15.50
No. 1 hvy. melting....	14.50 to 15.00
No. 2 hvy. melting....	12.75 to 13.25
No. 1 locomotive tires..	13.50 to 14.00
Misc. stand.-sec. rails.	15.25 to 15.75
Railroad springs	16.50 to 17.00
Bundled sheets	9.50 to 10.00
No. 2 RR. wrought ...	14.50 to 15.00
No. 1 busheling	8.50 to 9.00
Cast bor. & turn.....	5.50 to 6.00
Rails for rolling	15.75 to 16.25
Machine shop turn....	4.00 to 4.50
Heavy turnings	10.50 to 11.00
Steel car axles	17.00 to 17.50
Iron car axles	18.00 to 18.50
No. 1 RR. wrought....	12.50 to 13.00
Steel rails under 3 ft...	16.00 to 16.50
Steel angle bars.....	15.50 to 16.00
Cast iron carwheels...	13.50 to 14.00
No. 1 machinery cast.	12.50 to 13.00
Railroad malleable	15.50 to 16.00
No. 1 railroad cast....	12.50 to 13.00
Stove plate	7.50 to 8.00
Agricul. malleable	12.50 to 13.00
Grate bars	9.00 to 9.50
Brake shoes	11.25 to 11.75

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$14.00 to $14.50
No. 2 hvy. mltng. steel.	11.50 to 12.00
Scrap rails for mltng.	14.00 to 14.50
Loose sheet clippings..	8.50 to 9.00
Bundled sheets	10.50 to 11.00
Cast iron borings	6.50 to 7.00
Machine shop turn.....	7.50 to 8.00
No. 1 busheling	11.00 to 11.50
No. 2 busheling	6.50 to 7.00
Rails for rolling	15.00 to 15.50
No. 1 locomotive tires..	12.50 to 13.00
Short rails	17.00 to 17.50
Cast iron carwheels....	13.50 to 14.00
No. 1 machinery cast..	14.00 to 14.50
No. 1 railroad cast....	13.50 to 14.00
Burnt cast	9.50 to 10.00
Stove plate	9.50 to 10.00
Agricult. malleable ...	13.00 to 13.50
Railroad malleable	15.00 to 15.50

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$13.25 to $13.75
No. 2 hvy. mltng. steel.	12.25 to 12.75
Borings and turnings..	9.00 to 9.50
Long turnings	$8.50 to $9.00
Short shov. turnings..	10.00 to 10.50
No. 1 machinery cast..	14.50 to 15.00
Automotive cast	14.50 to 15.00
Hydraul. comp. sheets.	14.00 to 14.50
Stove plate	8.50 to 9.00
New factory bushel ...	12.75 to 13.25
Old No. 2 busheling ..	8.25 to 8.75
Sheet clippings	10.00 to 10.50
Flashings	12.50 to 13.00
Low phos. plate scrap.	13.75 to 14.25

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Hvy. melting steel.....	$10.75	$10.25
Rails, scrap	8.50	8.00
Machine shop turn.....	5.25	4.25
Boiler plate	7.00	6.00
Hvy. axle turnings.....	4.50	4.00
Cast borings	4.75	4.25
Steel borings	4.00	4.00
Wrought pipe	4.00	4.00
Steel axles	8.50	9.00
Axles, wrought iron....	9.00	9.50
No. 1 machinery cast..	11.75	10.75
Stove plate	7.00	6.75
Standard carwheels	11.00	10.50
Malleable	7.00	7.00
Shoveling steel	6.50	6.00
Bushelings	6.00	5.50
Compressed sheets	6.50	6.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$17.00 to $17.50
Hydraulic bundles	16.50 to 17.00
Machine shop turn.....	12.00 to 12.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$11.50 to $12.00
No. 2 hvy. mltng. steel.	10.25 to 10.75
Hvy. breakable cast...	11.00 to 11.50
No. 1 machinery cast.	12.00 to 12.50
No. 2 cast	10.50 to 11.00
Stove plate	.... 10.00
Steel car axles	16.00 to 17.00
Shafting	15.00 to 16.00
No. 1 RR. wrought ...	12.00 to 12.50
No. 1 wrought long....	11.00 to 11.50
Spec. iron & steel pipe	10.50 to 11.00
Forge fire	8.00 to 8.50
Rails for rolling	11.50 to 12.00
Short shov. turnings..	5.75 to 6.25
Machine shop turn.....	6.25 to 6.50
Cast borings	6.25 to 6.50
No. 1 blast furnace....	5.00 to 5.50
Cast borings (chem.)..	10.00 to 11.00
Unprepar. yard scrap.	6.50 to 7.00

Per gross ton, delivered local foundries:

No. 1 machn. cast.....	$14.00 to $14.50
No. 1 hvy. cast cupola.	11.50 to 12.00
No. 2 cast	10.50 to 11.00

Add 25c. to 50c. to above quotations to secure North Jersey prices.

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel.	$10.00 to $11.00
Scrap rails	11.90 to 12.15
No. 2 steel	10.00 to 10.25
Breakable cast	10.00 to 10.25
Machine shop turn....	6.00 to 6.25
Bund. skeleton long...	9.50 to 9.75
Shafting	15.50 to 16.00
Cast bor. chemical.....	6.00 to 7.00

Per gross ton delivered consumers' yards:

Textile cast	$12.00 to $13.50
No. 1 machine cast ..	12.00 to 13.50
Stove plate.....	9.50 to 10.00

EXPORT

Brokers' buying prices per gross ton:

New York, delivered alongside barges

No. 1 hvy. mltng. steel.	$11.50 to $11.75
No. 2 hvy. mltng. steel.	10.50 to 10.75
No. 2 cast	.... 10.00
Stove plate	.... 10.00
Rails (scrap)	11.50 to 12.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel.	$12.00 to $12.50
No. 2 hvy. mltng. steel.	11.00 to 11.50
Rails (scrap)	12.50 to 12.75
Stove plate	7.75 to 8.00
Machine shop turn.....	6.00 to 6.25

New Orleans, on cars at Stuyvesant Dock

No. 1 hvy. mltng. steel.	$12.60 to $12.75
No. 2 hvy. mltng. steel.	11.60 to 11.75

Los Angeles, on cars or trucks at local piers

No. 1 hvy. mltng. steel.	$10.50 to $11.00
Compressed bundles ...	8.50 to 9.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$32.00
Forging quality	39.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$32.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.80c.

Wire Rods

(No. 5 to 15/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$40.00
F.o.b. Chicago, Youngstown or Anderson, Ind.	41.00
F.o.b. Worcester, Mass.	42.00
F.o.b. Birmingham	43.00
F.o.b. San Francisco	49.00
F.o.b. Galveston	46.00

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago or Gary	2.10c.
F.o.b. Duluth	2.20c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Buffalo	2.15c.
Del'd Philadelphia	2.36c.
Del'd New York	2.40c.
F.o.b. Birmingham	2.20c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars Pacific ports	2.60c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh	1.90c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	1.95c.
F.o.b. Buffalo	2.00c.
F.o.b. Birmingham	2.05c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.45c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	2.05c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.10c.
Del'd Detroit	2.20c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributors)

F.o.b. Pittsburgh	1.90c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron

F.o.b. Chicago	1.80c.
F.o.b. Pittsburgh (refined)	2.10c.
Delivered New York	2.05c.
Delivered Philadelphia	2.10c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.35c.
F.o.b. Cleveland, Chicago and Gary	2.40c.
F.o.b. Buffalo	2.45c.
Del'd Detroit	2.50c.
Del'd eastern Michigan	2.55.c

*In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago or Gary	1.95c.
Del'd Cleveland	2.095c.
F.o.b. Coatesville or Spar. Pt.	2.00c.
Del'd Philadelphia	2.09c.
Del'd New York	2.19c.
F.o.b. Birmingham	2.05c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.45c.
Wrought iron plates, f.o.b. Pittsburgh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.45c.
F.o.b. Chicago	3.50c.
F.o.b. Coatesville	3.55c.
F.o.b. cars dock Gulf ports	3.85c.
F.o.b. cars dock Pacific ports	4.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
Del'd Cleveland	2.095c.
F.o.b. Buffalo or Bethlehem	2.00c.
Del'd Philadelphia	2.115c.
Del'd New York	2.1625c.
F.o.b. Birmingham (standard)	2.05c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.45c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago or Buffalo	2.35c.
F.o.b. cars dock Gulf or Pacific Coast ports	2.70c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

	Base per 100 Lb.
Spikes	2.75c.
Tie plates, steel	2.00c.
Tie plates, Pacific Coast ports	2.10c.
Track bolts, to steam railroads	3.75c.
Track bolts, to jobbers, all sizes (per 100 counts) 70 per cent off list	

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.95c.
No. 10, f.o.b. Gary	2.05c.
No. 10, del'd Detroit	2.15c.
No. 10, del'd Philadelphia	2.26c.
No. 10, f.o.b. Birmingham	2.10c.
No. 10, f.o.b. cars dock Pacific ports	2.50c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.60c.
No. 24, f.o.b. Gary	2.70c.
No. 24, del'd Detroit	2.80c.
No. 24, del'd Philadelphia	2.91c.
No. 24, f.o.b. Birmingham	2.75c.
No. 24, f.o.b. cars dock Pacific ports	3.25c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.60c.
No. 10 gage, f.o.b. Gary	2.70c.
No 10 gage, f.o.b. Detroit	2.80c.
No. 10 gage, del'd Philadelphia	2.91c.
No. 10 gage, f.o.b. Birmingham	2.75c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.20c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.05c.
No. 20 gage, f.o.b. Gary	3.15c.
No. 20 gage, del'd Detroit	3.25c.
No. 20 gage, del'd Philadelphia	3.36c.
No. 20 gage, f.o.b. Birmingham	3.20c.
No. 20 f.o.b. cars dock Pacific ports	3.60c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.20c.
No. 24, f.o.b. Gary	3.30c.
No. 24, del'd Philadelphia	3.51c.
No. 24, f.o.b. Birmingham	3.35c.
No. 24, f.o.b. cars dock Pacific ports	3.80c.
No. 24, wrought iron, Pittsburgh	4.95c.

Electrical Sheets

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.00c.
Armature	3.35c.
Electrical	3.85c.
Special Motor	4.90c.
Special Dynamo	5.60c.
Transformer	6.10c.
Transformer Special	7.10c.
Transformer Extra Special	7.60c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras, plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.50c.
F.o.b. Gary	3.60c.
F.o.b. cars dock Pacific ports	4.20c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.05c.
No. 20, f.o.b. Gary	3.15c.
No. 20, f.o.b. Birmingham	3.65c.
No. 20, f.o.b. cars dock Pacific ports	3.65c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c
No. 28, Gary	2.85c
No. 28, cars dock Pacific ports	3.35c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh.	1.95c.
All widths up to 24 in., Chicago	2.05c.
All widths up to 24 in., del'd Detroit	2.15c.
All widths up to 24 in., Birmingham	2.10c.
Cooperage stock, Pittsburgh	2.05c.
Cooperage stock, Chicago	2.15c.

Cold-Rolled Strips*

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.895c.
F.o.b. Worcester	2.80c.

* Carbon 0.25 and less.

Cold-Rolled Spring Steel

	Pittsburgh and Cleveland	Worcester
Carbon 0.25-0.50%	2.60c.	2.80c.
Carbon .51- .75	3.70c.	3.90c.
Carbon .76-1.00	5.45c.	5.65c.
Carbon Over 1.00	7.50c.	7.70c.

Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade

	Per Lb.
Bright wire	2.50c.
Spring wire	3.05c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.05
Smooth coated nails	2.05

	Base per 100 Lb.
Annealed fence wire	$2.80
Galvanized fence wire	3.15
Polished staples	2.75
Galvanized staples	3.00
Barbed wire, galvanized	2.55
Twisted barbless wire	2.55
Woven wire fence, base column	60
Single loop bale ties, base column	52

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel In.	Black	Galv.	*Wrought Iron* In.	Black	Galv.
⅛	57	37	⅛	..+91½	+138
¼ to ⅜	.60	44½	¼ & ⅜	+1½	+21½
½	.....64½	55	½	.....31½	15
¾	.....67½	59	¾	.....36½	20½
1 to 3	...69½	61½	1 & 1¼	.39½	25½
			1½	.....43½	28
			2	.....41½	26

Lap Weld

2	62	53½	2	37	22½
2½ to 3.65		56½	2½ to 3½	38	25
3½ to 6.67		58½	4 to 8	...40	28½
7 & 8.66		56½	9 to 12	..38	24½
9 & 10.65	½	56			
11 & 12.64	½	55			

Butt Weld, extra strong, plain ends

⅛	.....55½	42½	⅛	...+13	+45½
¼ to ⅜	.57½	46½	¼ & ⅜	+2½	+34½
½	.....62½	54½	½	.....32½	17½
¾	.....66½	58½	¾	.....37½	22½
1 to 3	...68	61	1 to 2	..43½	29

Lap Weld, extra strong, plain ends

2	60	52½	2	40	26
2½ to 3.64		56½	2½ to 4.45	½	33
3½ to 6.67	½	60	4½ to 6.45		33½
7 & 8	..66½	57	7 & 8	.46	33
9 & 10	..65½	56	9 to 12.41	½	30
11 & 12	..64½	55			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$ 7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.26	10.23
1¾ in. o.d.	13 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	17.61	16.01
2¾ in. o.d.	12 B.W.G.	19.29	17.54
3¼ in. o.d.	12 B.W.G.	20.45	18.59
3½ in. o.d.	12 B.W.G.	$21.45	$19.50
4½ in. o.d.	10 B.W.G.	41.08	37.35
3½ in. o.d.	11 B.W.G.	27.09	24.62
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.90

Extra for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.			5	%
12,000 lb. or ft. to 24,999 lb. or ft.			12½	%
6,000 lb. or ft. to 11,999 lb. or ft.			25	%
2,000 lb. or ft. to 5,999 lb. or ft.			35	%
Under 2,000 lb. or ft.			50	%

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago.	$48.40
6-in. and larger, del'd New York	45.20
*6-in. and larger, Birmingham	40.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	48.00
F.o.b. dock, Seattle	40.50
F.o.b. dock, Seattle	51.50

Class "A" and gas pipe, $3 extra.
4-in. pipe is $3 a ton above 6-in.

* Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $39. Birmingham, and $47.40, delivered Chicago and 4-in. pipe, $42, Birmingham, and $50.40 a ton, delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. x 6 in. and smaller	70 and 10
Larger than ½ in.	70 and 5
Lag bolts	70 and 5
Plow bolts, Nos. 1, 2, 3, and 7 heads	70 and 5
Hot-pressed nuts, blank or tapped, square	70 and 5
Hot-pressed nuts, blank or tapped, hexagon	70 and 5
C.p.c. and t. square or hex. nuts, blank or tapped	70 and 5
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes	60, 20 and 10
Stove bolts in packages, nuts attached	75
Stove bolts in packages, with nuts separate	75 and 5
Stove bolts in bulk	82½
Tire bolts	50 and 5

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.05
F.o.b. Chicago or Birmingham	3.15

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm.	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lbs. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread, 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $51 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base..... 2.55c.
Delivered price at Detroit is.. 2.70c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (½% Nickel)	$0.25
2100 (2½% Nickel)	0.95
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30) Molybdenum (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.10c.
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.40
Carbon Vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.05c. base per lb. Delivered Detroit, 3.20c.

STAINLESS STEEL No. 302

(17 to 19% Cr, 7 to 9% Ni, 0.08 to 0.20% C.)

(Base Prices f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	33c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.
Drawn wire	28c.

TOOL STEEL

	Base per Lb.
High speed	57½c.
High carbon chrome	37c.
Oil hardening	21c.
Special	19c.
Extra	15¾c.
Regular	12½c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Based on Exchange rate as of Oct. 6

Ferromanganese, export	$45.58
Billets, open-hearth	29.74 to $31.01
Tin plate, per base box	4.74 to 4.84
Steel bars, open-hearth	39.87
Beams, open-hearth	38.61
Channels, open-hearth	39.87
Angles, open-hearth	38.61
Black sheets, No. 24 gage	51.66
Galvanized sheets, No. 24 gage	61.50

CONTINENTAL

Per Metric Ton, f.o.b. Continental Ports

Based on Exchange rate of Oct. 6

Billets, Thomas	$19.27
Wire rods, No. 5 B.W.G.	36.90
Steel bars, merchant	26.64
Sheet bars	19.68
Plate, ¼ in. and up	35.42
Plate, 3/16 in. and 5 mm.	34.85
Sheets, ⅛ in.	36.90
Beams, Thomas	25.58
Angles (Basic)	25.58
Hoops and strip base	32.79
Wire, plain, No. 8	44.03
Wire nails	47.15
Wire, barbed, 4 pt. No. 10 B.W.G.	71.74

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH

	Base per Lb.
Plates	3.25c.
Structural shapes	3.25c.
Soft steel bars and small shapes	3.15c.
Reinforcing steel bars	3.15c.
Cold-finished and screw stock:	
Rounds and hexagons	3.60c.
Squares and flats	3.60c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	3.30c.
Hoops	3.80c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.45c.
Galv. sheets (No. 24), 25 or more bundles	4.05c.
Hot-rolled sheets (No. 10)	3.05c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.77
Spikes, large	3.25c.
	Per Cent Off List
Track bolts, all sizes, per 100 count	60
Machine bolts, 100 count	65-5
Carriage bolts, 100 count	65-5
Nuts, all styles, 100 count	65-5
Large rivets, base per 100 lb.	$3.65
Wire, black, soft ann'l'd, base per 100 lb.	3.05c.
Wire, galv. soft, base per 100 lb.	3.40c.
Common wire nails, per keg	2.30c.
Cement coated nails, per keg.	2.30c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, rounds	3.20c.
Soft steel bars, squares and hexagons	3.35c.
Cold-fin. steel bars:	
Rounds and hexagons	3.75c.
Flats and squares	3.75c.
Hot-rolled strip	3.40c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.65c.
Spikes (keg lots)	3.85c.
Track bolts (keg lots)	4.85c.
Rivets, structural (keg lots)	3.80c.
Rivets, boiler (keg lots)	3.90c.
	Per Cent Off List
Machine bolts	*65
Carriage bolts	*65
Lag screws	*65
Hot-pressed nuts, sq. tap or blank	*65
Hot-pressed nuts, hex. tap or blank	*65
Hex. head cap screws	87½
Cut point set screws	75 and 10
Flat head bright wood screws	70
Spring cotters	55
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
Black ann'l'd wire per 100 lb.	$3.95
Com. wire nails, 50 kegs or more	2.40c.†
Cement c't'd nails, 50 kegs or more	2.40c.†

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants wihtin the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

†Prices for city and suburbs only.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	3.50c.
Structural shapes	3.47c.
Soft steel bars, rounds	3.51c.
Iron bars, Swed. charcoal	6.75c. to 7.00c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.06c.
Flats and squares	4.06c.
Cold-rolled; strip, soft and quarter hard	3.36c.
Hoops	3.66c.
Bands	3.66c.
Hot-rolled sheets (No. 10)	3.15c. to 3.41c.
Hot-rolled ann'l'd sheets (No. 24*)	3.75c. to 4.10c.
Galvanized sheets (No. 24*)	4.10c. to 4.50c.
Long terne sheets (No. 24)	5.25c. to 5.35c.
Armco iron, galv. (No. 24†)	5.65c.
Toncan iron, galv. (No. 24†)	5.65c.
Galvannealed (No. 24†)	5.75c.
Armco iron, hot-rolled annealed (No. 24†)	5.10c.
Toncan iron, hot-rolled annealed (No. 24†)	5.10c.
Armco iron hot-rolled (No. 10†)	4.15c.
Toncan iron, hot-rolled (No. 10†)	4.15c.
Cold-rolled sheets (No. 20) less than 1000 lbs.	
Standard quality	4.65c.
Deep drawing	5.40c.
Stretcher leveled	5.40c.
SAE, 2300, hot-rolled	6.97c.
SAE, 3100, hot-rolled	5.37c.
SAE, 6100, hot-rolled, annealed	9.57c.
SAE, 2300, cold-rolled	8.03c.
SAE, 3100, cold-rolled, annealed	7.43c.
Floor plate ⅛ in. and heavier	5.30c.
Standard tool steel	11.25c.
Wire, black annealed (No. 9)	3.50c.
Wire, galv. (No. 9)	3.85c.
Tire steel, 1 x ½ in. and larger	3.85c.
Open-hearth spring steel	4.00c. to 10.00c.
Common wire nails, base per keg	$3.21
	Per Cent Off List
Machine bolts, square head and nut:	
All diameters	65 and 10
Carriage bolts, cut thread:	
All diameters	65 and 10

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.
† 125 lb. and more.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.55c.
Bars, soft steel (rounds and flats)	3.45c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	3.60c.
Cold-fin. rounds, shafting, screw stock	4.00c.
Hot-rolled annealed sheets (No. 24)	4.30c.
Galv. sheets (No. 24)	4.90c.
Hot-rolled sheets (No. 10)	3.40c.
Black corrug. sheets (No. 24)	4.30c.
*Galv. corrug. sheets	4.90c.
Structural rivets	4.15c.
Boiler rivets	4.25c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts; all quantities	65

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.10c.
*Structural shapes	3.10c.
*Soft steel bars, small shapes, iron bars (except bands)	3.25c.
‡Reinforc. steel bars, sq. twisted and deformed	3.01c.
Cold-finished steel bars	4.01c.
*Steel hoops	3.55c.
*Steel bands, No. 12 and 3/16 in. incl.	3.30c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.85c.
†Galvanized sheets (No. 24)	4.50c.
*Hot-rolled annealed sheets (No. 10)	3.20c.
Diam. pat. floor plates, ¼ in.	5.05c.
Swedish iron bars	6.25c.

These prices are subject to quantity differential except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 25 bundles or over.

‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.41c.
Soft steel bars	3.10c.
‡Reinforc. steel bars	2.10c.
†Cold-finished steel bars	3.75c.
Flat-rolled steel under ¼ in.	3.46c.
Cold-finished strip	†3.00c.
Hot-rolled annealed sheets (No. 24)	3.91c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.21c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.46c.
*Black ann'l'd wire, per 100 lb.	$2.80
*No. 9 galv. wire, per 100 lb.	3.15
*Com. wire nails, base per keg	2.25

†Outside delivery 10c. less.
*For 5000 lb. or less.
‡Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.52c.
Floor plates	5.27c.
Bars, rounds, flats and angles.	3.42c.
Other shapes	3.57c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.57c.
Cold-finished bars	3.97c.
Hot-rolled annealed sheets (No. 24) 25 bundles or more.	3.72c.
Galv. sheets (No. 24) 3750 lb. or more	4.07c.
Galvanized sheets (No. 24) over 3500 lb.	4.07c.
Hot-rolled sheets (No. 10)	3.32c.
Structural rivets	4.50c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.88
Com. wire nails, base per keg:	
Any quantity less than carload.	3.04
Cement c't'd nails, base 100-lb keg	3.50
Chain. lin. per 100 lb	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$20.37
4-in.	48.14
Lap-welded steel boiler tubes, 2-in.	19.38
4-in.	45.32

BUFFALO

	Base per Lb.
Plates	3.48c.
Struc. shapes	3.35c.
Soft steel bars	3.25c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.80c.
Rounds and hex.	3.80c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.26c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.53c.
Galv. sheet (No. 24)	4.80c.
Bands	3.53c.
Hoops	3.53c.
Heavy top-rolled sheets	3.28c.
Com. wire nails, base per keg.	$2.85
Black wire, base per 100 lb. (2500-lb. lots or under)	4.00
(Over 2500 lb.)	3.90

BOSTON

	Base per Lb.
Channels, angles	3.65c.
Tees and zees, under 3"	3.90c.
H beams and shapes	3.64c.
Plates — Sheared, tank, and univ. mill, ¼ in. thick and heavier	3.66c.
Floor plates, diamond pattern	5.46c.
Bar and bar shapes (mild steel)	3.65c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.75c. to 4.75c.
Half rounds, half ovals, ovals and bevels	4.90c.
Tire steel	4.90c.
Cold-rolled strip steel	2.45c.
Cold-finished rounds, squares and hexagons	4.15c.
Cold-finished flats	4.10c.
Blue annealed sheets, No. 10 ga.	3.75c.
One pass cold-rolled sheets No. 24 ga.	4.30c.
Galvanized steel sheets, No. 24 ga.	4.30c.
Lead coated sheets, No. 24 ga.	5.95c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.29c.
Structural shapes	3.52c.
Plates	3.52c.
Floor plates	5.27c.
Hot-rolled annealed sheets (No. 24)*	4.14c.
Hot-rolled sheets (No. 10)**	3.24c.
Galvanized sheets (No. 24)	4.82c.
Bands	3.49c.
Hoops	3.49c.
†Cold-finished bars	3.84c.
Cold-rolled strip	3.18c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.44c.
Bolts and nuts, in cases, 70 and 10 per cent off list	
Broken cases..65 and 10 per cent off	

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

* Base less 0.25c., 3500 lb. and over. Add 0.50c. per hundred lb. for broken bundles.

** Base less 0.25c., 1500 to 3749 lbs.; less 0.50c., 3750 to 7499 lb.; less 0.75c., 7500 lb. and over.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

Country territory to be equalized on the Chicago plan.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.41c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.31c.
Soft steel bars, squares and hexagons	3.46c.
Hot-rolled strip	3.51c.
Hot-rolled sheets (No. 10)	3.26c.
Hot-rolled annealed sheets (No. 24)	4.16c.
Galvanized sheets (No. 20)	4.76c.
Cold-finished steel bars	3.76c.
Cold-rolled strip	3.33c.
Structural rivets (keg lots)	4.01c.
Boiler rivets, cone head (keg lots)	4.11c.
Track spikes (keg lots)	4.06c.
Track bolts (keg lots)	5.06c.
Black annealed wire	3.40c.
Com. wire nails	2.60c.
Cement coated nails	2.60c.

	Per Cent Off List
Machine bolts carriage bolts and lag screws	70 to 75
Hot-pressed nuts, sq. and hex. tapped or blank (keg lots)	70

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	3.45c.
Structural shapes	3.55c.
Plates	3.55c.
Cold-finished bars	4.00c.
Bands and hoops	3.65c.
Hot-rolled annealed sheets, No. 24	4.30c.
Galvanized sheets, No. 24	4.90c.

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	3.10c.
Structural shapes	3.10c.
Reinforcing bars	....prices on application
Plates	3.10c.
Hot-rolled sheets, No. 10	3.20c.
Bands	3.30c.
Hoops	3.55c.
Special threading steel	3.20c.
Diamond pattern floor plates ¼ in. and heavier	5.10c.
Galvanized bars and small shapes	5.60c.
Galvanized bands	5.80c.
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	3.88c.

All prices are for 2000 lb. and more.

For second zone add 10c. per 100 lb. for trucking.

List size extras of Aug. 15, 1935, and cutting extras to be added.

For cold-rolled products, list size extras from Jan. 1, 1936, and cutting extras to be added.

CHATTANOOGA

	Base per Lb.
Mild steel bars	3.46c.
Iron bars	3.46c.
Reinforcing bars	3.46c.
Structural shapes	3.66c.
Plates	3.66c.
Hot-rolled sheets No. 10	3.46c.
Hot-rolled annealed sheets, No. 24*	3.41c.
Galvanized sheets No. 24*	3.96c.
Steel bands	3.71c.
Cold-finished bars	4.281c.

* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	3.57c.
Shapes, bar size	3.57c.
Iron bars	3.57c.
Structural shapes	3.77c.
Plates	3.77c.
Hot-rolled sheets, No. 10	3.57c.
Hot-rolled annealed sheets, No. 24	4.37c.
Galvanized sheets, No. 24	5.07c.
Steel bands	3.82c.
Cold-drawn rounds	4.04c.
Cold-drawn flats, squares, hexagons	6.04c.
Structural rivets	4.25c.
Bolts and nuts, per cent off list	65
Small rivets, per cent off list	50

NEW ORLEANS

	Base per Lb.
Mild steel bars	3.45c.
Reinforcing bars	3.50c.
Structural shapes	3.65c.
Plates	3.65c.
Hot-rolled sheets, No. 10	3.65c.
Hot-rolled annealed sheets, No. 24	4.35c.
Galvanized sheets, No. 24	4.95c.
Steel bands	4.05c.
Cold-finished steel bars	4.55c.
Structural rivets	4.25c.
Boiler rivets	4.25c.
Common wire nails, base per keg	$2.45
Bolts and nuts, per cent off list	70

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.60c.	3.80c.	3.65c.
Shapes, standard	3.60c.	3.80c.	3.65c.
Soft steel bars	3.60c.	3.80c.	3.90c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.45c.	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.30c.	4.35c.	4.60c.
Hot-rolled sheets (No. 10)	3.70c.	3.90c.	3.85c.
Galv. sheets (No. 24 and lighter)	5.00c.	4.60c.	5.00c.
Galv. sheets (No. 22 and heavier)	5.00c.	4.80c.	5.00c.
Cold finished steel			
Rounds	6.05c.	6.10c.	6.00c.
Squares and hexagons	7.30c.	7.35c.	6.35c.
Flats	7.80c.	7.85c.	7.35c.
Common wire nails—base per keg less carload	$2.90	$2.90	$2.90

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
High-heat duty, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$45.00
High-heat duty, New Jersey	50.00
High-heat duty, Ohio	40.00
Intermediate, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	40.00
Intermediate, New Jersey	43.00
Intermediate, Ohio	35.00
Ground fire clay, per ton	7.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago District	54.00
Birmingham	$48 to 50.00
Silica cement per net ton	8.00

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$45.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	45.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester, Pa.	$65.00
Chemically bonded, f.o.b. Baltimore	55.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.; Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	$20.50
Delivered Brooklyn	22.9289
Delivered Newark or Jersey City	21.9873
Delivered Philadelphia	21.3132
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	19.50
F.o.b. Jackson, Ohio	21.25
Delivered Cincinnati	19.82
F.o.b. Duluth	20.00
F.o.b. Provo, Utah	17.50
Delivered San Francisco, Los Angeles or Seattle	22.315
F.o.b. Birmingham*	15.88

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of .70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

F.o.b Everett, Mass.; Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	$20.00
Delivered Boston Switching District	20.50
Delivered Newark or Jersey City	21.4873
Delivered Philadelphia	20.8132
F.o.b. Buffalo	18.50
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	19.00
Delivered Cincinnati	18.82
Delivered Canton, Ohio	20.3482
Delivered Mansfield, Ohio	20.8832
F.o.b. Jackson, Ohio	20.75
F.o.b. Provo, Utah	17.00
F.o.b. Birmingham	14.50

Bessemer

F.o.b. Everett, Mass.; Bethlehem, Birdsboro and Swedeland, Pa.	$21.50
Delivered Boston Switching District	22.00
Delivered Newark or Jersey City	22.9873
Delivered Philadelphia	22.3132
F.o.b. Buffalo and Erie, Pa., and Duluth	20.50
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago	20.00
F.o.b. Birmingham	21.00
Delivered Cincinnati	21.0807
Delivered Canton, Ohio	21.3182
Delivered Mansfield, Ohio	21.8832

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$24.00

Gray Forge

Valley or Pittsburgh furnace	$19.00

Charcoal

Lake Superior furnace	$22.50
Delivered Chicago	25.7528

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	22.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$75.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$26.00
50-ton lots 3-mo. shipment	24.00
F.o.b. New Orleans	26.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	$69.50
50% (ton lots)	77.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 6.00 to 6.50%	$22.75

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10.00 to 10.50%	$27.75
10.51 to 11.00%	28.25
11.00 to 11.50%	28.75
11.51 to 12.00%	29.25
12.01 to 12.50%	29.75
12.51 to 13.00%	30.25
13.01 to 13.50%	30.75
13.51 to 14.00%	31.25
14.01 to 14.50%	31.75
14.51 to 15.00%	32.25
15.01 to 15.50%	32.75
15.51 to 16.00%	33.25
16.01 to 16.50%	33.75
16.51 to 17.00%	34.25

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads	$1.30
Ferrotungsten, lots of 5000 lb.	1.35
Ferrotungsten, smaller lots	1.40
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y.	$2.50
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$137.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	142.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	58.50
Ferrophosphorus, electric, 24%, in carlots, f.o.b. Anniston, Ala., per gross ton with $3 unitage, freight equalized with Nashville, Tenn.	75.00
Ferromolybdenum, per lb. Mo del.	95c.
Calcium molybdate, per lb. Mo del.	80c.
Silico spiegel, per ton, f.o.b. furnace, carloads	$38.00
Ton lots or less, per ton	43.00
Silico-manganese, gross ton, delivered.	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00

Note: Spot prices are $5 a ton higher except on 75 per cent ferrosilicon on which premium is $10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$4.80
Old range, non-Bessemer, 51.50%	4.65
Mesabi, Bessemer, 51.50%	4.65
Mesabi, non-Bessemer, 51.50%	4.50
High phosphorus, 51.50%	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry Algeria	12.50c.
Iron, low phos., Swedish, average, 68½% iron	Nominal
Iron, basic or foundry, Swedish, aver. 65% iron	9.50c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	27c.
Man., African, Indian, 44-48%	25c.
Man., African, Indian, 49-51%	26c.
Man., Brazilian, 46 to 48½%	Nominal 25c.

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid delivered nominal	$15.25 to $15.50
Tungsten, domestic, scheelite delivered, nominal	15.00

Per Gross Ton

Chrome, 45% Cr_2O_3, lump, c.i.f. Atlantic Seaboard (African)	$17.50
45 to 46% Cr_2O_3 (Turkish)	$16.50 to 17.00
48% Cr_2O_3 (African)	20.50
48% min. Cr_2O_3 (Turkish)	19.25
Chrome concentrate, 50% and over Cr_2O_3, c.i.f. Atlantic ports	22.00
52% Cr_2O_3 (Turkish)	21.75
48 to 49% Cr_2O_3 (Turkish)	19.25

FLUORSPAR

Per Net Ton

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$18.00
Domestic, barge and rail	18.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	19.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	22.00
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	35.00

FUEL OIL

Per Gal.

F.o.b. Bayonne or Baltimore No. 3 distillate	4.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	3.75c.
Del'd Ch'go, No. 3 industrial	5.00c.
Del'd Ch'go, No. 5 industrial	3.77c.
Del'd Cleve'd, No. 3 distillate	5.75c.
Del'd Cleve'd No. 4 industrial	5.50c.
Del'd Cleve'd No. 5 industrial	5.00c.

COKE AND COAL

Coke

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$3.75 to $4.00
Foundry, f.o.b. Connellsville, Prompt	4.25 to 5.75
Foundry, by-product, Chicago ovens	9.00
Foundry, by-product, del'd New England	11.50
Foundry, by-product, del'd Newark or Jersey City	9.60 to 10.05
Foundry, by-product, Philadelphia	9.38
Foundry, by-product, delivered Cleveland	10.30
Foundry, by-product, delivered Cincinnati	9.50
Foundry, Birmingham	6.50
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports	14.75

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	$1.50 to $1.75
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.90
Gas coal, ¾-in. f.o.b. Pa. mines	2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45

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Sales Offices: NEW YORK—30 Church St. • PITTSBURGH—Oliver Bldg. • CLEVELAND—Hanna Bldg.

FABRICATED STEEL

. . . Lettings slightly lower at 9300 tons compared with 9850 tons a week ago.

o o o

. . . New projects higher at 14,100 tons as against 11,290 tons last week.

o o o

. . . Plate awards call for 9760 tons.

NORTH ATLANTIC STATES

Durham-Lisbon, Me., 295 tons, bridge, to American Bridge Co.

East Somerville, Mass., 450 tons, addition to Ford plant, to R. C. Mahon Co., Detroit.

Clinton, Mass., 328 tons, bridge, to Truscon Steel Co.

Waterbury, Conn., 350 tons, extension to factory building, Chase Brass & Copper Co., to American Bridge Co.

Brooklyn, 400 tons, St. Francis Assisi school, to Lehigh Structural Co.

Garden City, L. I., 460 tons, department store, Frederick Loeser & Co., to Bethlehem Steel Co.

Steuben County, N. Y., 100 tons, State bridge, to Lackawanna Steel Construction Co.

Kearny, N. J., 1400 tons, grade elimination bridge, to Bethlehem Steel Corp.

Lakehurst, N. J., 138 tons, storage building, naval air station, to Belmont Iron Works.

Allenport, Pa., 280 tons, building for Pittsburgh Steel Co., to Fort Pitt Bridge Works Co.

Pittsburgh, 100 tons, extension to Pennsylvania Truck Lines garage, to Pittsburgh-Des Moines Steel Co.

SOUTH AND SOUTHWEST

Orange, Va., 100 tons, State highway bridge, to Virginia Bridge Co.

Charleston, W. Va., 295 tons, loft building for Woodrum, Inc., to Pittsburgh Bridge & Iron Works, Pittsburgh.

North Little Rock, Ark., 400 tons, bridge, to Virginia Bridge Co.

CENTRAL STATES

Columbus, Ohio, 270 tons, King Avenue viaduct, to Bethlehem Steel Co.

Lorain, Ohio, 100 tons, building for American Stove Co., to Kilroy Structural Steel Co.

Cleveland, 115 tons, building for Lindsay Wire Weaving Co., to Fort Pitt Bridge Works Co.

Chicago, 250 tons, machinery, etc., for South Ashland Avenue bridge, to American Bridge Co.

Grant and Crawford Counties, Wis., 910 tons, bridge, to Midland Structural Steel Co.

Milwaukee, 700 tons, Blatz brewery addition, to Milwaukee Bridge Co.

Henry County, Iowa, 245 tons, truss spans, to Clinton Bridge Works.

St. Louis Park, Minn., 920 tons, two bridges, to American Bridge Co.

St. Louis, 125 tons, warehouse for Federal Barge Line, to Mississippi Valley Structural Steel Co.

WESTERN STATES

Denver, 345 tons, building for Colorado Bureau of Roads, to E. Burkhardt & Sons Steel & Iron Works Co., Denver.

San Francisco, 200 tons, furniture exchange at 10th and Market Streets, to Soule Steel Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Newburgh, N. Y., 200 tons, fertilizer plant for Swift & Co.

Onondaga and Herkimer Counties, N. Y., 650 tons, two bridges.

Absecon, N. J., 150 tons, crossing elimination; bids taken Oct. 27.

Lancaster, Pa., 200 tons, plant addition for Hamilton Watch Co.

Lancaster, Pa., 700 tons, Armstrong Cork Co. factory addition.

Elk County, Pa., 123 tons, State highway work; new bids Oct. 30.

Luzerne County, Pa., 138 tons, State highway work; new bids Oct. 30.

Upper Darby, Pa., 140 tons, post office; bids taken Oct. 27.

SOUTH AND SOUTHWEST

State of Tennessee, 1350 tons, transmission towers and substation for Tennessee Valley Authority.

Blountstown, Fla., 1200 tons, bridge.

Arkansas-Kansas, 470 tons, Arkansas River bridge.

CENTRAL STATES

Detroit, 3250 tons, sewer and Pere Marquette viaduct.

Cincinnati, 2650 tons, viaduct superstructural; Bethlehem Steel Co., low bidder.

WESTERN STATES

State of Colorado, 5000 tons, extension of Moffat tunnel.

Los Angeles, 500 tons, 8-in. structural steel ribs for support of 16-ft. tunnel; bids opened.

FABRICATED PLATES

AWARDS

Abington, Mass., 120 tons, standpipe, to Chicago Bridge & Iron Works.

Louisville, Ky., 1800 tons, 12 coal barges for American Barge Lines, to Dravo Contracting Co., Pittsburgh.

Los Angeles, 520 tons, 24-in. pipe for Department of Water and Power, to Southwest Welding Co.

Los Angeles, 220 tons, 42,000-bbl. tank for Vernon Co., to Consolidated Steel Corp.

Aberdeen, Wash., 2700 tons, pipe line to Hoquiam, to Federal Pipe & Tank Co.

Salem, Ore., 4400 tons, water pipe line, to American Concrete & Steel Pipe Co.

NEW PROJECTS

Denver, 3900 tons for Board of Water Commissioners; bids Nov. 10.

SHEET PILING

AWARDS

Bellevue, Iowa, 1575 tons, Mississippi River dam No. 12, to Bethlehem Steel Co.

British Steel Output At Record High

LONDON (Special Correspondence).—The British Iron and Steel Federation announces that at the end of September there were 111 furnaces in blast in the United Kingdom, two having been blown in during the month.

Pig iron production during September amounted to 650,800 tons, compared with 635,800 tons in August and 529,600 tons in September, 1935. The month's production included 148,500 tons of hematite, 366,400 tons of basic, 108,100 tons of foundry and 13,300 tons of forge pig iron.

Production of steel ingots and castings in September amounted to 1,027,000 tons, compared with 827,700 tons in August, 1936, and 855,900 tons in September, 1935.

M. S. KAPLAN CO., iron and steel scrap merchant, has moved its general offices to the Continental Illinois Bank Building, 231 South La Salle Street, Chicago. Ben G. Kaplan, president of the company, is president of the Chicago chapter of the Institute of Scrap Iron and Steel, and is a member of the board of directors of that trade body.

THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

. . . Machinery order conditions remain spotty.

° ° °

. . . Inquiries are active and some resumption of program buying is indicated.

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. . . German machine tool group plans visit.

° ° °

By L. M. WAITE

° ° °

THE domestic machine tool market has been spotty during the week. Orders booked have been largely for machines which have been under consideration for some time. Continued inquiries, however, appear to indicate well-sustained interest among both large plants and small shops. Foreign orders are frequent and serve to maintain satisfactory total bookings particularly with makers of the smaller standard production units.

A group of German machine tool builders and engineers are scheduled to arrive on the steamship *Bremen*, Nov. 13, for a four weeks' tour through shops in New York, Philadelphia, Pittsburgh, Chicago, Detroit, Cleveland, Rochester, Schenectady and a number of New England points. It is understood that a return date has been set as Dec. 11.

A catalog listing some 50 standard machine tools manufactured by the Japanese company, Shinohara Machinery Works, Ltd., is being distributed by Asano Bussan Co., export agents, Osaka, Japan, New York office 165 Broadway, New York. Included in the catalog are various types of lathes, shapers, planers, milling machines, radials, cutter grinders, hobbing and boring machines.

Cleveland

INTEREST in machinery and equipment the past week was centered to considerable extent on the National Metal Congress held in Cleveland. Exhibits included heat treating furnaces, welding equipment, cutting, sawing and filing machines, testing machines and various other types of machinery, and a very satisfactory volume of sales of the equipment exhibited was made. In quite a few cases machines were sold right off the floor. The exhibit also brought out some good inquiry.

Pittsburgh

THE bright spot in the local picture is the persistence shown in the steady stream of inquiries. Data are being requested on presses, milling machines, shapers, lathes and drilling machines. The interlude between inquiries and orders has been narrowing over the past several months and presents an improved situation. Orders have shown little change over the past week, but are still coming in at a rate above the first half of this month. While some manufacturers are able to make a little better delivery, the condition is spotty, and the general situation is no different with respect to promised shipments.

Chicago

INCREASED buying continues, and the outlook is for an active fall period in this area. Deliveries, influenced by increased sales, are again being extended, and some machine tool plants, operating at capacity, can promise nothing better than eight to nine weeks. Allis Chalmers Mfg. Co. has made selections, but has not placed orders for its Springfield, Ill., plant. A number of railroads, including the Chicago & North Western, are preparing budgets for 1937. There are suggestions afloat that several major industries are preparing extensive buying moves for next year.

New York

SALES organizations are extremely active on proposals which have been standing for some time. Orders are being booked quite regularly, although in numbers there appears to be a falling off, not, however, to a particularly noticeable extent. The New Jersey section of the territory is said to look fruitful for the remainder of the year, although the monthly volume of the past six months may not be fully sustained.

Philadelphia

THE week has shown considerable sales activity on new proposals with indications that some program buying is not far distant. The general run of replacement orders has fallen off slightly, but new inquiries have created an optimistic feeling as to totals of anticipated business for the remainder of the year.

New England

ORDERS continue to be reasonably satisfactory in volume with possibly less in the way of decline than was anticipated at this particular time. Progressive activity in certain so-called program buying constitutes the immediate bright spot among those who have been predicting sustained monthly averages for the remainder of the year.

Detroit

NEW orders are still very light, and factory representatives and dealers continue to spend a great deal of their time and energy on demonstrations of machinery recently installed on the 1937 production lines. What new business there is of an immediate nature is largely fill-in equipment to balance these same production lines, although there are some inquiries out for replacement machinery on a cost-saving basis.

Cincinnati

SINGLE unit tool ordering increased the past week to make October levels comparable to previous peak months. Imminence of election has apparently not affected demand, manufacturers generally being of the opinion that the usual election reactions will not set in. Interest in heavy machinery is following the market uptrend, and builders report the sale of several planers the past month. Small lathe demand may almost be described as brisk, while milling machine and grinder business continues to be outstanding. Analysis of orders indicates fair distribution over all tool users, and, except for the usual seasonal interest of automotive manufacturers, no single industry is outstanding in purchases.

Plant operations moved upward to about 75 per cent of full capacity the past week. Delivery is still a problem.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Seversky Aircraft Corp., Farmingdale, L. I., has acquired two one-story plant buildings near present works at East Farmingdale, heretofore occupied by Grumman Aircraft Engineering Corp. and Ranger Aircraft Engine Corp., providing over 200,000 sq. ft. of floor space, including existing plant, for expansion in parts production and assembling. Company has also purchased flying field of 125 acres opposite airplane works, with hangar and shop unit of 16,000 sq. ft. floor space as well as seaplane base at Amityville, L. I., about four miles from plant, with hangar unit of 30,000 sq. ft. floor space, marine railway and other facilities. Both of these properties will be used for expansion in operations. Major Alexander P. de Seversky is president. Grumman company will build new plant for parts production and assembling at Central Park, Nassau County, L. I., where about 100 acres recently was purchased, and will begin superstructure soon; cost close to $85,000 with equipment. Ranger company, likewise, will remove aircraft engine-manufacturing plant to new location, increasing present facilities for parts manufacture and assembling.

Superintendent of Lighthouses, St. George, Staten Island, New York, asks bids until Nov. 2 for 422 special class welded steel plate can and nun buoys (Proposal 52407), 45 riveted steel plate similar type buoys (Proposal 52408), 10 special nun and 12 can buoys, steel construction (Proposal 52409), two steel can buoys, old style (Proposal 52410), three 5 x 15 lighted buoys, riveted steel (Proposal 52437); until Nov. 4, 12 steel gas buoys, from 5 to 9 ft. diameter, 15 to 38 ft. long, and four steel buoys of different types, all with skeleton lantern towers (Proposal 52388); until Nov. 5, four 7500-lb. cast iron mushroom anchors, totaling 31,040 lb. (Proposal 52456); until Nov. 6, wrought iron shackles and wrought steel buoy chain shackles (Proposal 52444).

Tubize Chatillon Corp., 2 Park Avenue, New York, has let general contract to Batson-Cook Co., West Point, Ga., for additions to viscose rayon mill at Rome, Ga., comprising two main units, one-story, 147 x 340 ft., and three stories, 150 x 200 ft., extension to mechanical dryer building, electric-steam power plant and other units. Cost about $2,500,000 with equipment. Robert & Co., Inc., Bona Allen Building, Atlanta, Ga., is architect and engineer.

New York Central Railroad Co., 466 Lexington Avenue, New York, plans one-story machine shop at car maintenance and repair works, Ashtabula, Ohio. Cost close to $40,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 3 for 22,400 lb. castings for turbine casings (Schedule 9166) for Brooklyn Navy Yard; 27 electric arc welding sets (Schedule 9112) for Brooklyn, Boston and Norfolk yards.

Allied Mercantile Co., 11 East Runyon Street, Newark, N. J., manufacturer of electrical equipment, parts, etc., has leased two-story building at 76-82 Coit Street, Irvington, N. J., about 20,000 sq. ft. floor space, for plant. About $50,000 will be expended for building improvements and new equipment. Nathan Cherlestein is president.

O-Pan-Ton Mfg. Co., 250 South Street, Newark, manufacturer of vacuum sweepers and parts, has leased building at New Jersey Railroad Avenue and Vanderpool Streets, about 50,000 sq. ft. floor space, for expansion. Present works will be removed to new location early in January and additional machinery installed.

Commanding Officer, Ordnance Department, Frankford Arsenal, Philadelphia, asks bids until Nov. 4 for plain plug gages (Circular 198), snap gages, concentricity gages, profile, flush pin and taper plug gages (Circular 200).

BUFFALO DISTRICT

Koch Brewing Co., 17 West Courtney Street, Dunkirk, N. Y., has let general contract to Meister Contracting Co., 12 West Third Street, for one-story addition. Cost over $45,000 with equipment. Julius C. Schultz, 1370 Main Street, Buffalo, is architect.

Excel Metal Cabinet Co., Jamestown, N. Y., plans rebuilding part of one-story plant at Falconer, N. Y., recently destroyed by fire. Loss about $125,000 with equipment. Charles A. Johnson is general manager.

Worthington Pump & Machinery Corp., Clinton and Roberts Streets, Buffalo, has let general contract to Austin Co., Cleveland, for one-story foundry addition. Cost about $75,000 with equipment. Main offices of company are at Harrison, N. J.

NEW ENGLAND

Wire Rope Corp. of America, Inc., 464 Congress Avenue, New Haven, Conn., has plans for one-story addition, 80 x 100 ft. Cost close to $40,000 with equipment. Leo F. Caproni, New Haven, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 3 for one motor-driven, heavy-duty, ball bearing tilting arbor saw (Schedule 9115) for Hingham, Mass., Naval Station; one motor-driven self-contained oil extractor (Schedule 9123) for Newport, R. I., yard; until Nov. 10, 97 extractors for 5-in., 38-caliber cartridge cases, and 23,000 extractors for 6-in. cartridge tanks (Schedule 9125) for Hingham Iona Island, Fort Mifflin and other naval stations.

Chase Brass & Copper Co., Waterbury, Conn., has plans for one-story addition, 60 x 460 ft., and will carry out superstructure by day labor. Cost over $60,000 with equipment.

Smith Paper, Inc., Lee, Mass., manufacturer of wrapping and other paper stocks, has let general contract to Daniel O'Connell Sons, Inc., 450 Hampden Street, Holyoke, Mass., for two one-story additions, 140 x 160 ft., and 130 x 130 ft., for expansion in machine department and paper-finishing division respectively. Cost over $125,000 with equipment. R. A. Packard is company engineer.

WASHINGTON DIST.

Campbell Metal Window Corp., Bush and Hamburg Streets, Baltimore, has let general contract to Davis Construction Co., 9 West Chase Street, for one-story addition, primarily for storage and distribution. Cost over $35,000 with equipment. Kubitz & Koenig, Emerson Tower Building, are consulting engineers.

General Purchasing Officer, Panama Canal, Washington, asks bids until Nov. 2 for steel wire brushes, copper burrs, transmission belting, steel doors, steel windows and other equipment (Schedule 3192); until Nov. 5, 100,000 lb. steel track spikes, lighting and power type cable, copper conductors, high-tension insulators, toggle switches, 85,000 railway tie plates and other equipment (Schedule 3191).

Burd Model Airplane Co., 330 Park Avenue, Baltimore, manufacturer of airplanes and parts, has leased part of building at Hanover and Pratt Streets, for expansion.

Quartermaster Depot, Washington, asks bids until Nov. 13 for 2430 steel lockers, various deliveries (Proposal 950-55).

Purchasing Officer, Department of Interior, Washington, asks bids until Nov. 4 for galvanized barbed wire, cattle-type, and steel fence posts (Proposal 1887) for Maricopa, Ariz.; one portable electric arc welder (Proposal 188) for Toppenish, Wash.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 3 for three 5-in. horizontal boring and drilling machines (Schedule 9100), four high-speed precision shapers (Schedule 9114), one universal milling machine (Schedule 9121), one 5-ft. heavy-duty radial drill, 13-in. diameter (Schedule 9124), two hydraulic shaper-planers (Schedule 9122), one planer (Schedule 9134), all motor driven, for Washington yard.

SOUTH ATLANTIC

Georgia Packing Co., Thomasville, Ga., meat packer, has let general contract to B. L. Brewton & Son, Thomasville, for one-story addition. Cost about $60,000, of which over one-half will be expended for equipment. A. Ten Eyck Brown, Forsyth Building, is architect, and C. T. Baker, 713 Glenn Street, consulting engineer, both of Atlanta.

Contracting Officer, Quartermaster Corps, Fort Benning, Ga., asks bids until Nov. 5 for steel conduit, switches, cutouts, copper wire, rubber-covered wire, cable and other equipment (Circular 148-36).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 3 for six four-wheel industrial tractors, front-wheel steer, rear-wheel drive (Schedule 9113) for Pensacola, Fla., Naval Station.

SOUTH CENTRAL

Louisville Gas & Electric Co., 311 West Chestnut Street, Louisville, plans extensions and improvements in steam-operated electric generating plant, including new 25,000-kw. turbo-generator unit and auxiliary equipment. Cost about $1,800,000.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Nov. 2 for steel gate track and guide rails for intake and spillway openings for Pickwick Landing dam, about 370 tons; until Nov. 16, electric generators and auxiliary equipment for Pickwick Landing power house.

Lewis Hunter Distilling Co., Cynthiana, Ky., has approved plans for one-story addition for storage and distribution. Cost close to $40,000 with equipment.

City Commission, Alexandria, La., asks bids until Nov. 4 for new 2500-kw. turbo-generator unit and accessories, pumping machinery and auxiliary equipment for municipal electric power plant. P. J. Convillon is secretary.

Vulcan Mfg. Co., Birmingham, manufacturer of metal cabinets and kindred products, has leased building at 2200 Avenue D, Ensley, Ala., and will remodel for new plant. W. A. McCutchen is head.

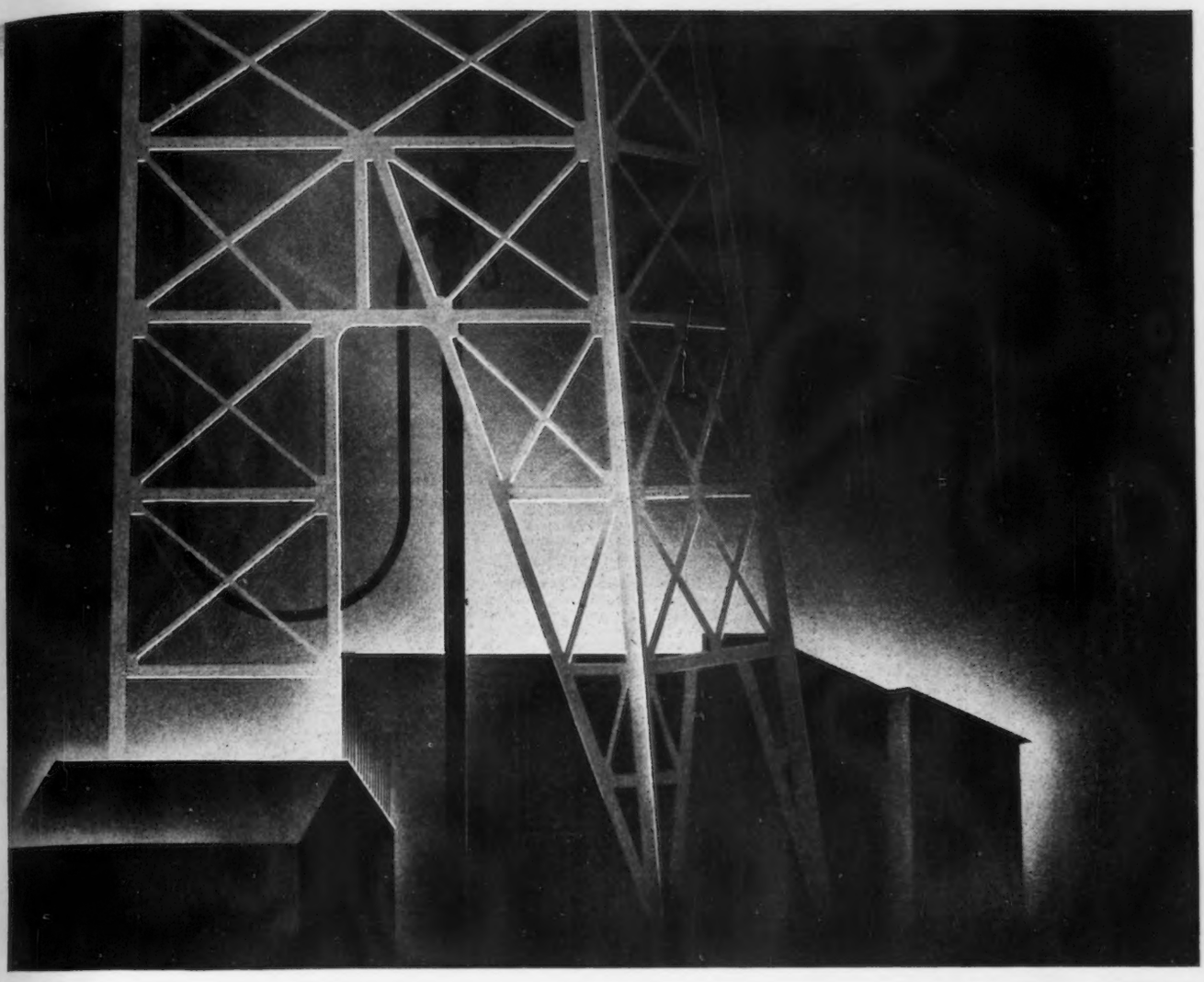
OHIO AND INDIANA

Hobart Brothers, Troy, Ohio, manufacturers of electric welding equipment, paint-spraying equipment, etc., have plans for one-story addition, 70 x 140 ft. Cost over $50,000 with equipment. William G. Ward, Mutual Home Building, is architect; Nelson J. Bell, Third National Bank Building, is consulting engineer, both Dayton, Ohio.

Red Star Products Corp., Solon Road, Bedford, Ohio, manufacturer of road-building and contractors' equipment, has leased about 30,000 sq. ft. floor space in former works of Godfredson Truck Co., Taft Avenue, N.E., and East 131st Street, Cleveland, for new plant, removing present works from Bedford and doubling production facilities.

Central Ohio Steel Products Co., Galion, Ohio, has let general contract to Jacob Wolf Co., Mansfield, Ohio, for one-story addition for expansion in machine shops. Cost close to $40,000 with equipment.

City Engineering Co., 35 South St. Clair Street, Dayton, Ohio, manufacturer of special machinery and parts, dies, etc., has let general contract to Hillsmith & Co., 108



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CLIMAX **MOLY** Mo-lyb-den-um

CUTS COSTS

CREATES SALES

South Third Street, engineer and contractor, for one and two-story addition, 64 x 210 ft., and 40 x 64 ft. respectively, primarily for machine shop. Cost close to $75,000 with equipment.

Contracting Officer, Material Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until Nov. 2 for steel, iron and brass welding rods (Circular 268), 5000 universal joint assemblies (Circular 265); until Nov. 3, one portable motor-generator (Circular 272), starter switch clamp assemblies, starter switch control arm assemblies, starter control rod guide assemblies, etc. (Circular 267).

Merchants Distilling Co., Terre Haute, Ind., will build six eight-story additions for storage and distribution, and new power house. Cost over $400,000 with equipment.

SOUTHWEST

Missouri Pacific Railroad Co., Thirteenth and Olive Streets, St. Louis, has let general contract to S. Patti Construction Co., 1114 Broadway, Kansas City, Mo., for rebuilding one-story engine house and repair shops at Osawatomie, Kan., recently destroyed by fire. Cost close to $150,000 with equipment.

American Tank & Equipment Co., Westwood Avenue, Oklahoma City, Okla., plans one-story addition for expansion in tank shops. Cost close to $50,000 with equipment. Company is affiliated with Black, Sivalls & Bryson, Inc., same place.

Union Potash & Chemical Co., Avalon, N. M., plans mill and refining plant at potash properties about 20 miles distant, with power house, machine shop and other mechanical departments. Cost over $85,000 with equipment.

American Liberty Oil Co., First National Bank Building, Dallas, Tex., plans new oil refinery near Talco, Tex., oil field, with department for gasoline production. Steel tank storage division will be installed, with pumping station, power house, machine shop and other units. Cost close to $450,000 with equipment.

WESTERN PA. DIST.

Pittsburgh Pipe & Coupling Co., Butler Plank Road, Glenshaw, Pittsburgh, has let general contract to Uhl Construction Co., 6000 Butler Plank Road, for one-story addition, 60 x 140 ft. Cost over $65,000 with equipment.

Pittsburgh Store Fixture & Equipment Co., 1046 Pennsylvania Avenue, Pittsburgh, manufacturer of refrigerators, display and other store fixtures, has purchased former silk mill of Schwarzenbach-Huber Co., Blairsville, Pa., comprising main building and smaller structures, 40,000 sq. ft. floor space, on seven-acre tract, and will remodel for branch plant. A division for production of air-conditioning equipment will be installed. Facilities will be provided for about 150 operatives.

MICHIGAN DISTRICT

Burroughs Adding Machine Co., 6071 Second Boulevard, Detroit, has engaged Albert Kahn, Inc., New Center Building, to prepare plans for new one-story plant on part of 140-acre tract at Plymouth, Mich., primarily for production of line of accessory products, including machine stands, metal furniture, etc. Cost over $250,000 with equipment.

Kelsey-Hayes Wheel Co., 3600 Military Road, Detroit, manufacturer of steel automobile wheels and kindred products, has plans for one-story foundry addition and improvements in present foundry division. Cost close to $50,000 with equipment. Giffels & Vallet, Inc., Marquette Building, is architect and engineer.

Auto Plane Corp., Mount Pleasant, Mich., recently organized with capital of $120,000 to manufacture small commercial airplanes and parts, has arranged with City Commission for temporary occupancy of Mechanics' Building, Island Park, for initial production of all-metal stainless steel aircraft units, one-piece body type. Company also plans erection of new plant near proposed municipal airport of city. Harry A. Miller and William J. Lofland are heads.

Great Lakes Chemical Corp., Manistee, Mich., care of Edwin N. Turner, Manistee, vice-president and general manager, recently formed with capital of $400,000 to manufacture industrial chemicals, will take bids soon for new plant at Filer City, Manistee County, for production of liquid bromine and allied specialties. Cost close to $150,000 with machinery. Joseph Horner, Grand Rapids, Mich., is president.

MIDDLE WEST

J. L. Clark Mfg. Co., Rockford, Ill., manufacturer of tin cans and containers, has plans for one-story addition, for which bids will be asked soon on general contract. Cost about $250,000 with equipment. Nimmons, Carr & Wright, 333 North Michigan Boulevard, Chicago, are architects and engineers.

Signal Corps Procurement District, 1819 West Pershing Road, Chicago, asks bids until Nov. 9 for terminal boxes, connecting blocks, coils and kindred equipment (Circular 30).

Kraft-Phenix Cheese Corp., 400 Rush Street, Chicago, will take bids early in December for new nine-story and basement plant on block front on Peshtigo Court, between Grand and Illinois Streets, 218 x 408 ft., five floors to be equipped for processing and manufacture, and remaining stories for laboratory, offices and other departments. An air-conditioning system will be installed. Cost close to $2,000,000 with machinery, including mechanical-handling equipment. Mundie, Jensen, Bourke & Havens, 39 South LaSalle Street, are architects. Company is a unit of National Dairy Products Corp., New York.

Continental Oil Co., 1018 South Second Street, St. Paul, Minn., with headquarters at Ponca City, Okla., plans one and two-story bulk oil storage and distributing plant on University Avenue, St. Paul. Cost about $85,000 with steel tanks and other equipment.

Des Moines Union Railway Co., Union Station, Des Moines, Iowa, has let general contract to John Wideberg, Des Moines, for one-story addition to engine house and repair shops, 1320 Mulberry Street. Cost about $30,000 with equipment.

Western Newell Mfg. Co., Freeport, Ill., manufacturer of hardware and kindred metal specialties, has plans for one-story addition, 40 x 100 ft. W. W. Hubbard, Gas & Electric Building, Rockford, Ill., is architect.

Trane Co., La Crosse, Wis., which recently completed a factory addition, 175 x 200 ft., has plans for another extension of similar size to accommodate increased demand for air-conditioning equipment, standard heating lines, and newly developed automatic gas-heating units for homes, etc. New investment will be upward of $85,000.

Madison Brass Works, 214 Waubesa Street Madison, Wis., has broken ground for shop addition, 30 x 70 ft.

Gillette Rubber Co., 799 Wisconsin Street, Eau Claire, Wis., has placed contract with Hoeppner-Bartlett Co., local, for second-floor addition to tire building, 60 x 200 ft., and third-floor addition to raw material house, 100 x 135 ft.

Wisconsin Axle Co., Oshkosh, Wis., division of Timken-Detroit Axle Co., Detroit, has leased 10,000 sq. ft. of manufacturing space at Waukegan, Ill., to relieve production at Oshkosh plant, now operating at heaviest capacity in its history.

Neenah Foundry Co., Neenah, Wis., is building shop extension, 60 x 80 ft., which is third addition of similar size since beginning of 1936. Payroll will be increased from 55 to 75 upon its completion.

West Allis, Wis., Board of Vocational Education, 1216 South Seventy-first Street, Milwaukee, has commissioned R. A. Messmer & Brother, architects, 231 West Wisconsin Avenue, Milwaukee, to plan vocational school addition to cost about $100,936. Application for PWA grant is pending. Fred E. Haker is president of board.

Joseph Schlitz Brewing Co., 235 West Galena Street, Milwaukee, has placed complete contract with John S. Metcalf Co., 105 West Adams Street, Chicago, for building and equipping additional grain elevators to cost $250,000. Joseph G. Schier is company architect.

Pittsburgh Plate Glass Co., 235 East Pittsburgh Avenue, Milwaukee, has placed general contract with W. W. Oeflein, Inc., 312 East Wisconsin Avenue, for erection of enamel plant, 60 x 220 ft., four stories and basement, costing about $225,000 with equipment. E. D. Griffin is general manager.

PACIFIC COAST

Milwaukee Brewing Co., Tenth and Bryant Streets, San Francisco, will take bids soon on general contract for three-story and basement mechanical-bottling and canning division. Cost over $70,000 with machinery. W. E. Murray, 908 Hayes Street, is consulting engineer.

D'Arcy Coach Works, 140 North Garfield Avenue, Alhambra, Cal., manufacturer of automobile bodies, has let general contract to R. A. Gibbs, 1501 Mission Road, for one-story plant unit, about 10,500 sq. ft. floor space. Cost close to $30,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 6 for one motor-driven, straight bevel gear generating machine, 25-in., with full standard equipment to operate automatically and accurately (Schedule 9109) for Mare Island Navy Yard.

Briggs Lemon Association, Santa Paula, Cal., has plans for new one-story and basement L-shaped packing plant, 140 x 210 ft., with one-story wing, 85 x 126 ft., for storage and distribution, compressor and boiler plant, and other mechanical units. Cost about $185,000 with machinery, including mechanical-handling equipment. Roy C. Wilson, Say Road, Santa Paula, is architect.

Idaho Meat Producers, Inc., Caldwell, Idaho, L. W. Botkin, Caldwell, secretary, plans one and two-story meat-packing plant, 125 x 140 ft. Cost close to $100,000 with equipment.

Copper Products Show Large Gain This Year

A MARKED increase in the sale of products made from copper and its alloys occurred during the first nine months of this year, according to a statement by F. S. Chase, president of the Copper and Brass Research Association at its fifteenth annual meeting. He said that more than 200,000,000 lb. of copper and its alloys will be used this year by the automobile industry. Other lines that are taking a good deal of copper are the electrical industry, manufacturers of oil burners and gift wares and other specialties.

The association elected the following officers: President, F. S. Chase, president of Chase Brass & Copper Co.; vice-presidents, John A. Coe, president of American Brass Co.; C. D. Dallas, president of Revere Copper & Brass, Inc., and Wylie Brown, president of Phelps Dodge Copper Products Corp.; treasurer, C. D. Dallas; secretary, Bertram B. Caddle.

International Nickel Adds Research Unit

THE International Nickel Co. of Canada, Ltd., announced on Oct. 21 the opening of the company's new research and development laboratory at Birmingham, England. This laboratory, which replaces an older one at Birmingham, was started last spring and has been constructed at a cost of approximately $150,000. It becomes part of a research and experimental organization within the company, which includes a modern laboratory at Bayonne, N. J., and one now under construction at Copper Cliff, Ont.